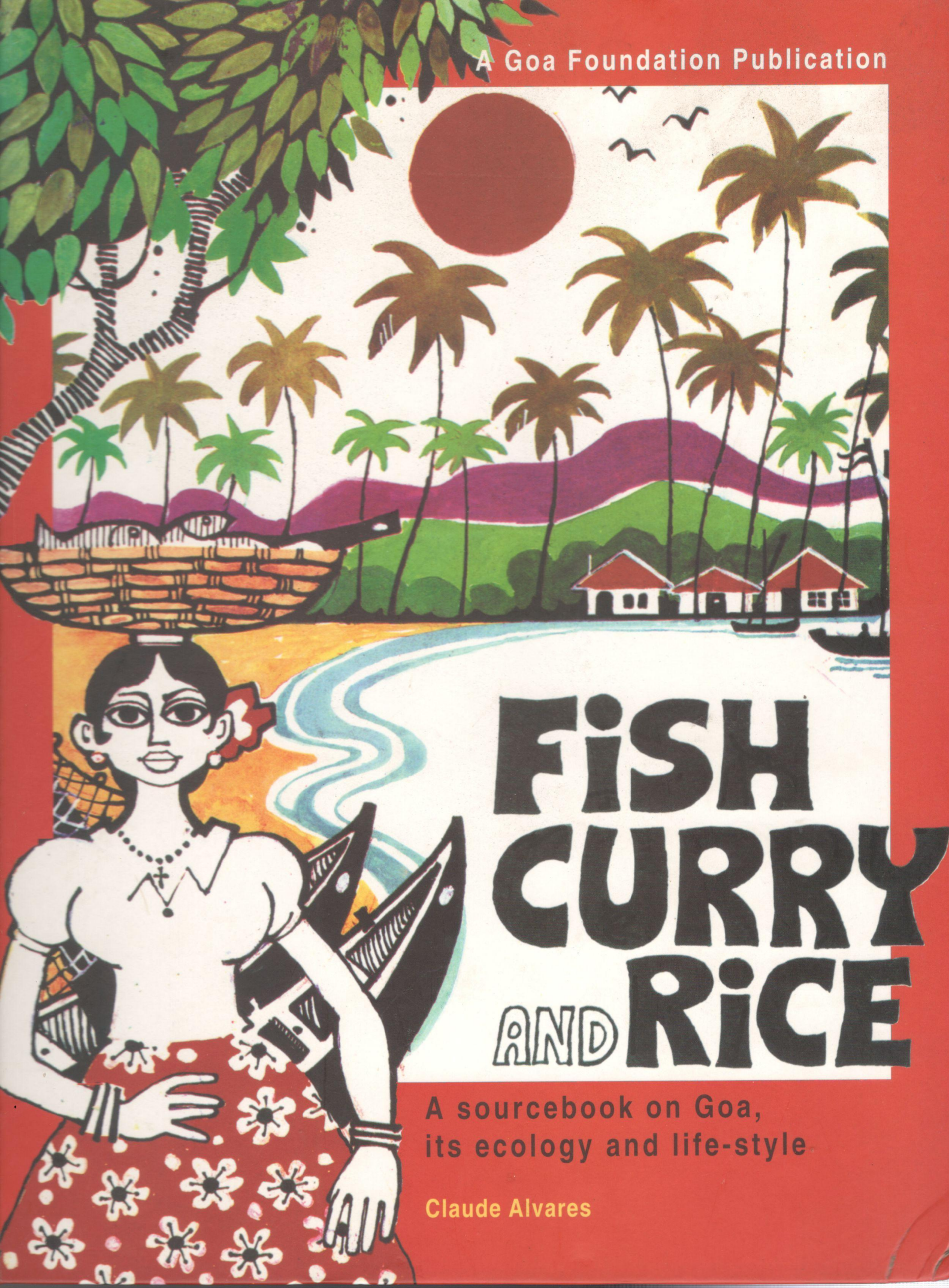


A Goa Foundation Publication



FISH CURRY AND RICE

A sourcebook on Goa,
its ecology and life-style

Claude Alvares

Fish Curry and Rice

A source book on Goa, its ecology and life-style

Edited by Claude Alvares

with the assistance of Vidyadhar Gadgil

The Goa Foundation

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Goa, India

Fish Curry and Rice
Edited by Claude Alvares

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A number of individuals have contributed articles, photographs and illustrations which have made this book what it is. Their names generally appear annexed to the texts contributed by them. We apologise if any contribution has gone unacknowledged, and will take corrective action, if this is brought to our notice, in future editions.

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DEDICATION	
THE ART OF BEING GOOD NATURED	
1. OVERVIEW	1
• RECIPE FOR LIFE • HISTORY • PHYSIOGRAPHY • HYDROLOGICAL CYCLE •	2
• MONSOON • GEOLOGY • RIVER SYSTEM • FISH CURRY RECIPES •	
2. THE WESTERN GHATS ECOSYSTEM	20
• GHAT ECOLOGY • FLORA • SACRED GROVES • AVIFAUNA • FAUNA •	
• REPTILES • ILLEGAL WILDLIFE TRADE • SNAKES • INSECTS • FOREST MANAGEMENT •	
• DHANGARS • WILDLIFE SANCTUARIES • PRIVATE FOREST •	
3. PLATEAU REGION	56
• INDUSTRIES • ZUARI & DORVOL SPRINGS • DU PONT • META STRIPS • INDUSTRIAL ESTATES •	
• POLLUTING COMPANIES • HAZARDOUS CHEMICALS • TEMPLE ZONE •	
4. THE ALLUVIAL AND COASTAL PLAINS	86
• WETLANDS & LAKES • AGRICULTURE • KHAZANS • PURAN FARMING •	
• COMUNIDADES • ORGANIC FARMING • PLANTATIONS • FLOODS •	
5. THE COASTAL REGION	128
• COASTAL ECOSYSTEM • MARINE BIODIVERSITY • SAND DUNES • COASTAL ISLANDS •	
• SALINE INTRUSION • TURTLES • BEACH CONSERVATION • ESTUARINE REGION • MANGROVES •	
6. FISHING	172
• GOANS & FISH • MECHANISATION • FISHING & POLLUTION •	
• SALT-WATER FISH • FRESH-WATER FISH • AQUACULTURE •	
7. TOURISM	196
• TOURISM DEVELOPMENT • TOURISM & ENVIRONMENT • GOLDEN GOA •	
• TOURISM PLANNING • OPPOSITION TO TOURISM • ECO-TOURISM •	
8. MINING	224
• MINING & ENVIRONMENT • MINING & WATER POLLUTION • DUST POLLUTION •	
• REHABILITATION OF MINING AREAS • UNDERMINING OF AGRICULTURE •	
9. INFRASTRUCTURE PROJECTS	248
• KONKAN RAILWAY • RELIANCE-SALGAONCAR POWER PLANT • SELAULIM DAM •	
• KAIGA NUCLEAR COMPLEX • TILLARI DAM • MEDIUM-SIZED DAMS •	
10. LAND USE PLANNING	270
• HISTORY OF PLANNING • TOWN PLANNING • COASTAL AREA PLANNING • PANJIM • MARGAO •	
• PONDA • MAPUSA • MORMUGAO • HERITAGE CONSERVATION • THE GOAN HOUSE • GOAN ARCHITECTS •	
11. PUBLIC HEALTH	304
• PUBLIC HEALTH • SEWAGE MANAGEMENT • SOLID WASTE DISPOSAL •	
• DOMESTIC VERMICOMPOST • SPRINGS & WELLS • RESURGENCE OF MALARIA •	
12. THE RESPONSE TO THE ENVIRONMENT CRISIS	324
• ENVIRONMENTAL LAWS • CRZ NOTIFICATION • GOA CZMP • WASTE RULES • NOISE RULES •	
• OFFICIAL RESPONSE • ENVIRONMENTAL JUDGEMENTS • GOA FOUNDATION PILs • NGOS •	
13. ECO-TRADITIONS	364
• NATURE IN HINDU RITUALS • COMMUNAL HARMONY AND INTERDEPENDENCE •	
• SACRED GROVES • DHARMA & TANKS •	
<i>Bibliography</i>	374
<i>Index</i>	376

Dedication

During the decade that *Fish Curry and Rice* has been in print, Goa's environment community has lost several of its leading lights and pioneers. We dedicate this volume to their memory. The green brigade that nature has reclaimed to her bosom includes:

• Urban Lobo

A chartered civil engineer, Urban was truly one of the pioneers of the environment movement in Goa: a leader of the public agitation that brought Zuari Agro Chemicals to heel in 1974/75, he also worked for the interests and well-being of the *ramponkars*. From 1990, he dedicated many intensive hours to educating people on the environment impacts of the Konkan Railway and the Nylon 6,6 project. However, this is hardly an exhaustive list of his concerns, most of which emerged out of his enormous love for Goa. Environmentalists will miss his technical acumen and guidance.

• Nilesh Naik

A young man of Savoi-Verem, Nilesh was an activist who worked to prevent the setting up of Du Pont's Nylon 6,6 plant in his village. He was shot dead by the police during the final days of the agitation that successfully got rid of the plant for good and became the first environmental martyr in recent times.

• Norman Dantas

A social activist and journalist, Norman helped form the Goa Foundation in 1986, after his permanent return to Goa from Maharashtra. Every year, a Memorial Prize is awarded in his name to the most effective social activist in the state.

• Anand Gaonkar

Living far in the interior village of Mayem, Anand fought the uncaring Konkan Railway Corporation for several years to get compensation for paddy fields destroyed by the Corporation's rail embankments through the Tikhazan. He succeeded in his quest when the Deputy Collector awarded huge compensation costs against the KRC. But Anand died shortly thereafter.

• Walfrido Antao

Walfrido was a Founder-Trustee of the Goa Foundation, and its first President. He led the agitation for cancellation of several leases that had been granted by the Goa government to private parties for mining sand from the sand dunes. Eventually, the government was compelled to cancel the leases to protect coastal ecology. Walfrido's anti-sand extraction committee was set up in the mid-seventies, much before environment consciousness became widespread in Goa (and the rest of the world). Like Urban, Walfrido too was a pioneer of Goa's environment movement and will be remembered as such when the state's environment history is eventually written for the edification of future generations.

The Art of Being Good Natured

When going through this book, you will find that we have often used the word 'development' in an almost pejorative or negative sense. We therefore hasten to add that we are not *against* 'development'. The difficulty is over what 'development' means and whom it is designed to benefit. We would therefore like to point out here, right at the very inception of this book, why we find the modern Western urban-industrial model of development objectionable, and to offer the outlines of an alternative development scenario which we here at the Goa Foundation subscribe to. This will certainly help the reader understand the perspective behind this book.

Development is one of the givens of modern life. If you say anything against it, you are assumed to be cantankerous at best and anti-national at worst. We definitely agree that development is needed: for example, people must have basic facilities like job guarantees, housing, clean water and air, uncontaminated food, energy, access to medicare, etc. We stand for a form of development which strengthens local communities, guarantees a reasonable and dignified standard of living for the general masses of the people, and is, finally, sustainable, i.e. does not cause damage to the environment on which we and future generations depend. *This, our current model of development emphatically does not do.*

When economists and politicians talk of development, they invariably mean this very Western notion of development which has already caused immense harm to the people of the world and damaged our environment almost beyond repair. It is based on irresponsible and unaccounted exploitation of nature. In fact, consumption is the very gospel of this model and there is no pause to consider whether there are natural limits to growth which we ignore at our own peril.

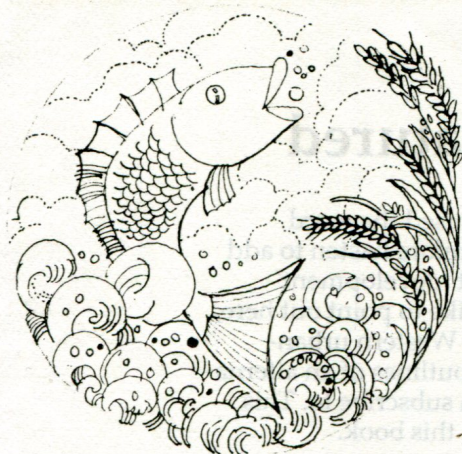
Needless to add, the present model is also the cause of increasing disparities between people within societies and between nations. As a rule, those powerful and already privileged always benefit more from the present model than those with little or nothing at all. In our part of the globe, this model is unthinkingly imposed as a panacea for all ills by our intellectually bankrupt and sterile political leaders under the guidance of Western governments, advisers and institutions.

For the hundreds of years that Goa has existed, its inhabitants were eminently successful in their interaction with natural systems. For example, through the engineering marvel of the *khazans*, they dealt effectively with the problem of saline water ingress, a natural feature of tidal rivers. In practically the whole of the coastal region, they maintained their residential dwellings well behind the line of sand dunes. They rarely had the kind of water shortages we are experiencing today because they intelligently created and maintained water harvesting systems that were based on deep knowledge of the topography. In short, they knew the art of survival while being good-natured (or good to nature) too.

The principal consequence of this way of doing business with nature was that *both nature and industry prospered*. As a result, when Goa became a part of India in 1961, she was the greenest of the Indian states and provoked wonder in all those who had the privilege to visit here and see for themselves.

Fish Curry and Rice is therefore a conscience document, written with the express purpose of providing details of the bills and costs adding up from the present, externally induced, development model. As we are already unable to pay these bills and are merely passing them on to society at large or to our kids, it is time we are called to book regarding the justness and fairness of our activities.

But *Fish Curry and Rice* is also a document of hope. We have taken pains to record the good work done by several organisations and individuals for the restoration of Goa and the rehabilitation of its ecology and worldview. We welcome you to join this process, for the good of Goa, and the good of humanity.



For us Goans, fish curry and rice reflect the basics of our ecology. We are first and foremost a coastal people, occupying a littoral niche. For centuries, we have harvested our principal source of nourishment from the seas.

But people do not live by fish alone. So we have used the plains that lie between the Western Ghats and the coast as a vast fertile medium for growing rice.

And to blend the two, fish and rice, together in a remarkable recipe that binds all Goans from Pernem to Canacona, and Calangute to Valpoi, we have nurtured and raised and tended coconut palms, hundreds and thousands of them.



A rampon (beach seine net) is brought in by fisher folk at Calangute

OVERVIEW

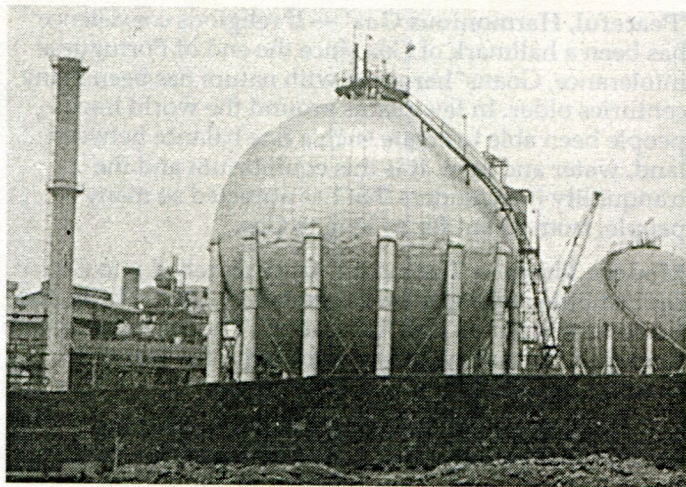
Goans, Fish Curry and Rice



Resort construction on sand dunes



Abandoned open-cast iron ore mining pit



Polluting Zuari Industries Limited synthetic fertiliser factory

The coconut forms the basis of our curries. From the coconut (and the cashew tree too) we have learnt the art of brewing the two *fenis*.

Fish curry and rice are the firm expression of our ecosystem, the copious harvests of our sustainable interaction with the natural environment.

It is these three primary elements of Goan life that have come under gross attack from one quarter or another ever since 'development' was sought to be introduced in this small State.

And that is the story that follows ...

A RECIPE FOR LIFE

Fish Curry and Rice is not a recipe book in the conventional sense. But it does attempt to tell of the Goan recipe for life. And why we should join and support all efforts to conserve it, nay, to enable it to flourish and thrive, in the interests of humankind.

Development has not been a major preoccupation of ordinary Goans for two historical reasons. Till 1961, Goa was under Portuguese rule. Portugal itself was comparatively unindustrialised compared to the other nations of Europe. Secondly, Portugal saw to it that Goa had consumer goods without having to undergo the rigours associated with industries producing such goods. With the single exception of iron ore mining.

With the departure of the Portuguese, the situation rapidly changed. Two major factories came up. One installed by Ciba-Geigy (later Novartis, now Syngenta), produces toxic pesticides. The other by the Birlas and US Steel: the Zuari Agro Chemicals (now Zuari Industries Limited), manufactures synthetic fertilisers. In addition to these two large units, the mining industry (iron and manganese ore) was the only other major species of modern development experienced by Goa. Industry and mining—both polluted, degraded and damaged the environment.

As this book will show, development, instead of improving the standard of living of Goenkars, ended up considerably diminishing their quality of life. Jobs were being provided, but these came attached with heavy doses of suffering for the rest of society—and nature.

Despite the knowledge that the Goan coastal ecosystem is under strain, the government has gone out of its way to overload it with a stunningly large number of tourists whose extravagant demands may only be met by compromising further the basic needs and rights of the Goenkar. Worse, the government has even tried to go out of its way to evict the Goenkar in some areas in order to make way for the tourist promoter.

The tourism industry provides a chilling and clear example of how development seeks to not merely replace the Goenkar, but also his environment. The Fort Aguada Hotel replaces the Goan village with a Spanish *hacienda*. The Leela Beach takes over land at Mobor on which toddy tappers eke their livelihood.

The toddy tapper is part of the Goan way of life. For centuries he has staked his own ecological niche, fed himself and his family, and maintained the environment. But the Leela Beach and other resorts raise their structures over his grave. And both pretend to celebrate the Goan way of life!

We hope this report succeeds in outlining well the increasing burdens imposed by unthinking 'development' on the Goan ecosystem and on those thousands who for centuries have raised their lives and culture in harmony with it. Urgent action is necessary if Goan culture is not to become fully extinct!

There is no ready made recipe for protecting the Goan ecosystem—it is something that all citizens must create together. This book is a small attempt to contribute to the evolution of such a recipe.

GOA: OLD CLAIMS TO FAME

There can be little doubt that Goa was among the most important *entrepôts* of the ancient and medieval world. That it was known to the Greeks even before Alexander of Macedonia approached the Indus is indication enough of eminence in antiquity. And it certainly was one of the fabled realms around which tales from the Arabian Nights were woven.

The flourishing mercantile community dealt in fine calico and muslins, jewels, gold and silver, pepper, spices, camphor and perfumes—apart from the more mundane betelnut, betel leaves, paddy and victuals. Whilst some ships brought the riches of the east, the Arabs brought horses.

It was not just an exchange point; the robust trade spawned local industries including spinning and weaving, brass and iron works, jewellery, oil extraction and, of course, shipbuilding.

The index of its stature was the internationally acceptable gold currency then in use, embossed with the regal leonine crest of the ruling Kadambas and their patron deity, Saptakoteswara.

When the Portuguese arrived five centuries later, Goa was under Muslim rule. The city and port had shifted north, to the banks of the Mandovi. But it was then, by all accounts, even more important and splendidly prosperous.

Writing in 1511, the Portuguese Tome Pires observed that Goa was key to 'first and second India' (meaning the peninsula). Afonso de Albuquerque obviously had more than just that in mind when he conquered Goa the previous year. Indeed, it could safely be said that with this conquest, Albuquerque changed the face of world trade.

Before Portugal discovered the sea route to India, trade between Occident and Orient was monopolised by the Arabs. This they did by sailing goods from India up the Persian Gulf to Hormuz and transporting them thence overland to the continent. When Albuquerque seized Goa (and then Daman and Diu), the Arabs' sources were cut off. Portugal took control of trade and built its empire—until the Dutch, French and English made inroads and the Portuguese empire began its irreversible decline as a

world power. The world then changed and Goa began to recede into the fringes of history.

'Kashi of the Konkan', 'Rome of the East' — On quite another plane, though deriving from the very strength of its great material prosperity, Goa has been a spiritual centre of a different kind at different times, prompting the labels 'Kashi of the Konkan' and 'Rome of the East'.

Little is known of Hinduism in Goa under previous rulers, but there is substantial evidence of the Kadambas (1000-1300 AD) having been generous patrons of religion. Several temples were built by this dynasty (the ruins of only one, at Tambdi Surla, remain), yet more important perhaps were the medieval centres of learning instituted during this period. The Kadambas created an elaborate system to support *agrarahas* or *brahmapuris* at which learned Brahmins taught the Vedas, Upanishads, Shastras, Shrutis and Puranas.

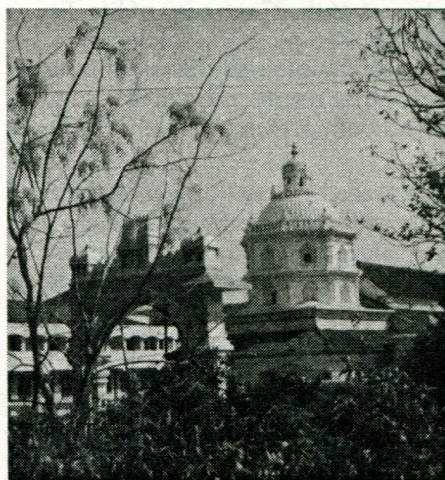
Less than three centuries after the eclipse of the Kadambas in nearby Goa-Velha, the Portuguese raised the 'Rome of the East' at Old Goa. And just as the Hindu 'Kashi' flourished amidst the commerce and prosperity of Gopakapattana, this Christian 'Rome' soared at the centre of the thriving Portuguese empire in the East.

A French traveller recorded, in the early 17th century, that there were then at least 50 convents and churches in the city with a following of over 1.5 lakh Christians! Besides the archbishop, there was also a bishop and every religious order in the East had its superior here. Even the little that is left today is impressive in its scale and grandeur.

'Peaceful, Harmonious Goa' — If religious coexistence has been a hallmark of Goa since the end of Portuguese intolerance, Goans' harmony with nature has been many centuries older. In few places around the world have people been able to create such a fine balance between land, water and man. It is this equilibrium and the tranquillity it engenders that has attracted so many people, from so far, for so long to Goa.

Modern Times — The Indian Army marched into Goa against little resistance on December 19, 1961. The Indian Government hailed it as 'Liberation'. The Portuguese screamed: 'Invasion!' A few years later, the Supreme Court of India held it was a 'Conquest'.

By then, however, Parliament had amended the Constitution (in early 1962) and Goa together with



Goa's Ancient Names

Indian: Aparant, Gomant, Govarashtra, Goparashtra, Govapuri, Gopakapuri, Gopakapattana, Gove (the last four were the names of Goa's capitals).

Greek: Chersonesus or Nelkinda (Periplus), Nekanidon (Pliny), Melinda or Tricadiba Insula (Ptolemy), Nincilda (Peutingerian Tables).

Arabic: Sindabur, Chintabor, Cintabor.

Former Capitals — Chandrapur (now Chandor) under the Kadambas from 1000 AD to 1049; Gopakapattana (now Goa-Velha) also under the Kadambas till 1440 AD; and Gove (now Old Goa) under the Bahamanis and then the Portuguese

from 1440 to 1740 AD. The Portuguese took a decision in 1684 to shift their capital to Mormugao, but it was never fully implemented until, finally—and long after Old Goa was laid low—the capital was shifted to Panjim in the mid-1700s.

Former Rulers:

200—500 AD: Bhojas and Satavahanas

500—750 AD: Badami (Western) Chalukyas

750—1000 AD: Goa Shilaharas

1000—1300 AD: Goa Kadambas

1300—1360 AD: Frequent Changes

1360—1470 AD: Vijayanagaras

1470—1510 AD: Adil Shahi Bahamanis

1510—1961 AD: Portuguese

Socio-Economic Indicators

• Population (2001 Census)

Total: 1,343,998 (13.43 lakh) persons

Proportion: 658,381 (6.58 lakh) females, 685,617 males. Sex Ratio 960. Declined from 967 in 1991.

Decadal Growth Rate: 14.89%

Density: 363 per sq km

Child (0-6 years) population: 142,152

Sex Ratio in child population: 933 (much less than in total population!)

Scheduled Castes comprise just over 2% of the total population. Population of **Scheduled Tribes** is negligible, but communities like Kunbis, Gawdas, Velips and Dhangars, widely considered Goa's original tribes and estimated at 30% of population are not included in this category.

• Education

Literacy (2001 Census): 82.32% (88.88% for males, 75.51% for females)

Primary Schools (1999-00): 1281 (100639 students)

Middle Schools (1999-00): 444 (71636 students)

Secondary Schools (1999-00): 365 (62718 students)

Higher Secondary Schools (1998-99): 81 (21612 students)

Colleges (1998-99): 41 (18296 students)

Goa is second only to Kerala in terms of literacy.

As on 31st Dec. 1997, number of job seekers on the live register of the employment exchange are about 18% of the population in the age group of 15 to 39 years.

• Essential Services

Piped Water: Capacity 299 MLD, consumption 263 MLD (1998-99)

Power: 1066 million kilowatt hours (1999-00) Industrial to total consumption—47.44% Transmission and distribution losses are estimated at 27%.

• Health

Birth Rate: 14.3 (1994). India 28.81

Infant Mortality: 18.8 per 1000 live births (1991 census)

Death Rate: 6.55 (1994)

Government Hospitals/Health Centres [with beds] (1999-00): 32 Beds: 2,874

Private Hospitals (1999-00): 106 Beds: 1,936

Government Health Centres/Sub-centres/Dispensaries [without beds] (1999-00): 200

Doctor to Population Ratio: 1:750 (1989-90)

• Communications

TV: 1 Relay Transmitter, 2 Channels. Receivers unknown.

Radio: 1 Broadcasting Station, 2 Channels. Receivers unknown.

Print: Newspapers and periodicals 34 (1992-93) Readers unknown.

Telephone connections: 129348 as on 31.08.00.

Public Call Offices: 2623 as on 31.08.00.

Post Offices: 258, letter boxes: 814 as on 31.03.00

• Transport

Roads: Length—9240.49 km (as on 31.3.1999)

Main Waterways (1999-00): 23

Passengers ferried (1996-97): 6921477

Vehicles in operation (as on 31.03.2000): 318299; two-wheelers: 227933

Bus Routes: 599

• Economic Indices

Net State Domestic Product (1997-98): Rs 321235 lakhs.

Per Capita NSDP (as above): Rs 24,610

No. of banking offices: 375 (1996)

Bank Deposits: Rs 3714.31 crores (1996)

Bank Credits: Rs 1248.11 crores (1996)

Daman and Diu (the other Portuguese enclaves) had become a centrally administered Union Territory of India. A Lieutenant Governor was sworn in and an informal 'Consultative Council' of 29 members was constituted on September 24, 1962. It advised the Union Government till the first popular elections were held in 1964.

Thereafter, Goa, Daman and Diu had a common legislative assembly of 30 members headed by a chief minister. It possessed only advisory powers. All decisions were taken in New Delhi, subject to approval by Parliament.

The highlights of the ensuing years were: an historic Opinion Poll in which Goans voted against merger with neighbouring Maharashtra; and an unprecedented massive, sustained movement which culminated in official language status being conferred on Konkani.

The scenario changed on May 30, 1987 when Daman and Diu were delinked as a separate Union Territory and Goa became the 25th full-fledged State of the Indian Union. Since the elections in 1989, the State has had a 40-member assembly with full legislative powers.

The most remarkable development post-statehood has been chronic political instability. During the 25 years between 1964 and 1989 there were just three chief ministers. After the 1989 elections, there have been no less than thirteen in the space of eleven years, some with terms lasting as little as a few months, and one surviving for just four days! The sordid farce of horse-trading, defection, political chicanery and skulduggery that the people have been witnessing for the past ten years has been of great disservice to the Goan people and economy. Politicians have shamelessly pursued power and its (illegitimate) privileges at all costs with complete disregard for all norms and principles, and the losers have been the Goan people and the environment. It is hardly surprising that *Outlook* magazine rated Goa one of India's worst governed states.

After the 73rd and 74th Constitution amendments, Goa was required to have a three-tiered political setup, with decentralisation of political powers to local authorities. Government enacted the Goa Panchayati Raj Act in 1993 to enable panchayats to have exclusive jurisdiction over several local issues. It also amended the Goa Municipalities Act, 1968, to bring that Act in line with the Constitution's requirements. The middle tier comprising of Zilla Parishads have only just come into existence.

In the older dispensation, there were 374 revenue villages, divided into 183 village panchayats, in turn divided into 10 'development blocks'. The administration was run through the Collector at the district level, the Mamlatdar at the taluka level and Sarpanch at the panchayat level. There are also 11 municipal towns administered by Municipal Councils and Chief Officers. The Municipal Councils came under the Director of Municipal Administration in Panjim. Though legally the Panchayats and Councils have new, enlarged and sweeping powers and separate jurisdiction after the Constitutional amendments, they continue to operate mentally under the old dispensation.

The major political parties today are the Congress-I and the Bharatiya Janata Party (BJP). But most MLAs will ditch their party whenever they are promised power.

PHYSIOGRAPHY

The land which we call Goa is a narrow strip of earth 105 km long and 65 km wide covering a total area of 3701 sq kms.

This means that Goa, while being one of the smallest states of India, is nearly six times the size of Singapore or a little larger than Luxembourg or Mauritius.

Goa is a part of the West coast region and is similar in physical features to the neighbouring regions of Karnataka and Maharashtra. But some features lend the Goan landscape and scenery a distinctive charm of their own.

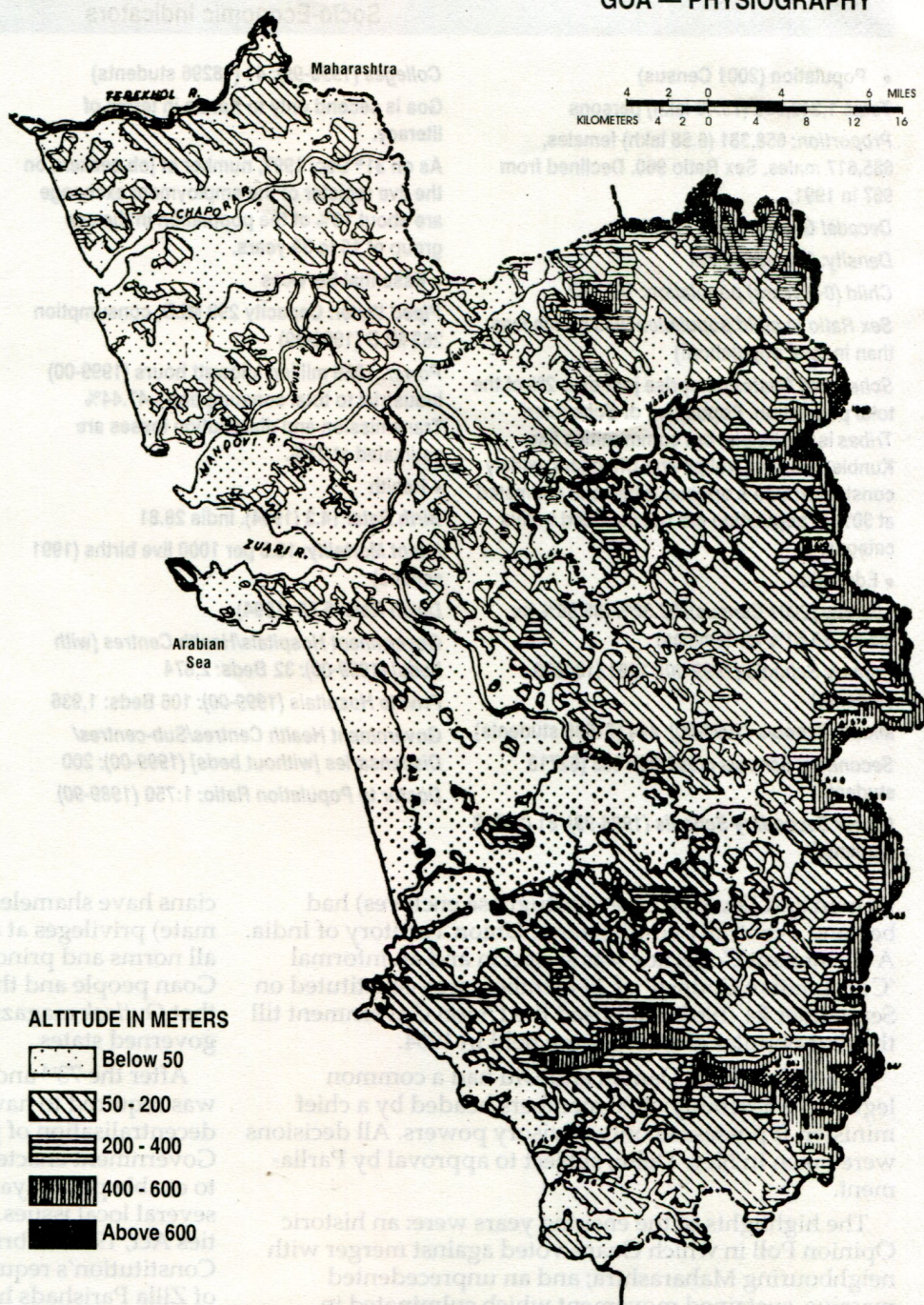
Broadly speaking, there are three main physical divisions: the mountainous region of the Sahyadris in the east, the middle level plateaus in the centre and the low-lying river basins with the coastal plains.

The most visible or well-known part of Goa is the coastal belt which runs from north to south, while the least known is the Western Ghat region, which also runs from north to south in the hinterland. Sandwiched in between is the midland region, apparently nondescript, but nevertheless with its own significant ecological and cultural characteristics.

When speaking of nature, however, it is essential to keep the total picture in mind while looking at any of the parts. Every region is interrelated with every other in a complex fashion and changes in one are bound to have a consequent effect on the others. Thus, while looking at any region of Goa, we should strive to keep a holistic view of Goa as a single ecosystem at the back of our minds.

The portion of the Sahyadris lying in Goa has an area of about 600 sq km and an average elevation of 600 metres. The crestline extends in an arc for about 125 km. This area, part of the Western Ghat region, is the catchment area of the rain in Goa and nature has covered the area with forests. These protect the land from falling water and ensure that the water does not run off immediately, taking much of the soil along with it. Further, forests conserve the water and are prime sources of the major Goan rivers, the lifeline of the land.

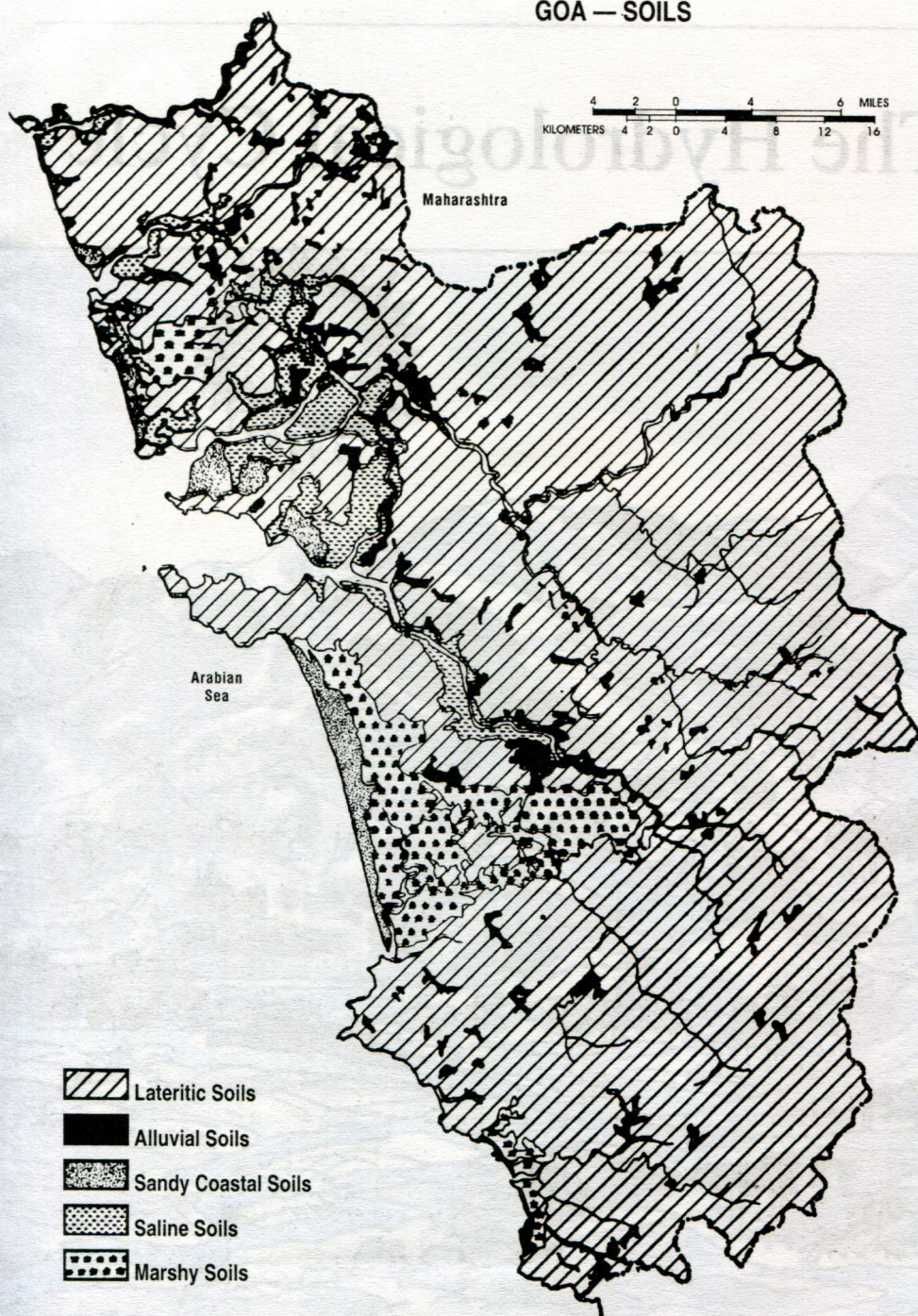
The central portion consists, by and large, of plateaus at varying levels, not exceeding about 100 metres and not less than 30 metres in height. While apparently nondescript, this 'midland' portion nevertheless has significant ecological and cultural characteristics, often in sharp contrast to coastal Goa.



The coastal region can be divided into two interrelated ecozones—the coastal region proper and the flood plains/alluvial flats. These latter are formed by the rivers which deposit eroded material from the Sahyadris along their banks. These are areas of rich cultivation with rural settlements of agricultural and fishing populations.

Nature is alive, and change is the hallmark of life. In a physical sense, Goa changes every day. Some changes are visible, like the changing profile of the beaches with the tides. Others work slowly, like the changing face of the forests. And finally, some changes can only be measured in geological time. In addition to these natural changes, human beings have also been adding their bit to the balance, with thoughtless 'development' actually creating an imbalance.

GOA — SOILS



GEOLOGY

The political boundaries of Goa correspond quite closely with its natural, geological features. The northern boundary, for instance, runs along the Tiracol river (the mouth of the river lies in Goa). On the eastern side, the boundary is demarcated by the Sahyadris; on the west, by the Arabian Sea. The southern section is closed off by a peak about 111 metres high near Polem.

The principal geological feature of the land is the extensive laterization which occurs because of Goa's position in the tropical moist climate, subject to vast seasonal changes. The laterite caps are extensive over most of the terrain, mountains, plateaus or plains. The laterite feature (and the *khazan* lands) together delayed construction of the Konkan Railway in Goa by about four years.

The laterites are associated with important elements of life in Goa. Bricks carved out of them are universally used in the construction of Goan houses and walls; second, they are associated with iron and manganese ore deposits. Laterite formations also store water like sponges. The laterite brick quarries are now rapidly getting depleted. Mining is undoing the storages, actively depleting the watersheds and inaugurating the threat of permanent water shortages. (For more detailed information on the specific geological features of Goa please consult the book *Earth Resources for Goa's Development* published by the Geological Survey of India, Hyderabad 1985—see box below.)

Book Review

Earth Resources for Goa's Development, G.S.I., Calcutta pp 618 (1985).

Under supervision of the Geological Survey of India, Hyderabad, the Geological Survey of India organised a seminar in September 1981, to investigate potential earth resources for Goa's development. The collection of papers prepared for the seminar are included in the present volume published by the G.S.I., Calcutta. The papers contain a large quantity of information, some of it quite technical, on several aspects of these 'Earth Resources'. There are several papers for

example on the geology and geomorphology of Goa and the distribution of various mineral resources including bauxite, limestone, silica, iron ore and manganese. Extensively covered is the history of iron ore mining in Goa and problems of the industry. There are extremely critical sections on the environmental hazards caused by unrestrained mining activity which the Goan reader will never get through the Goan newspapers. Several papers also examine surface and groundwater resources including their exploitation through irrigation projects like Anjunem and Selaulim.

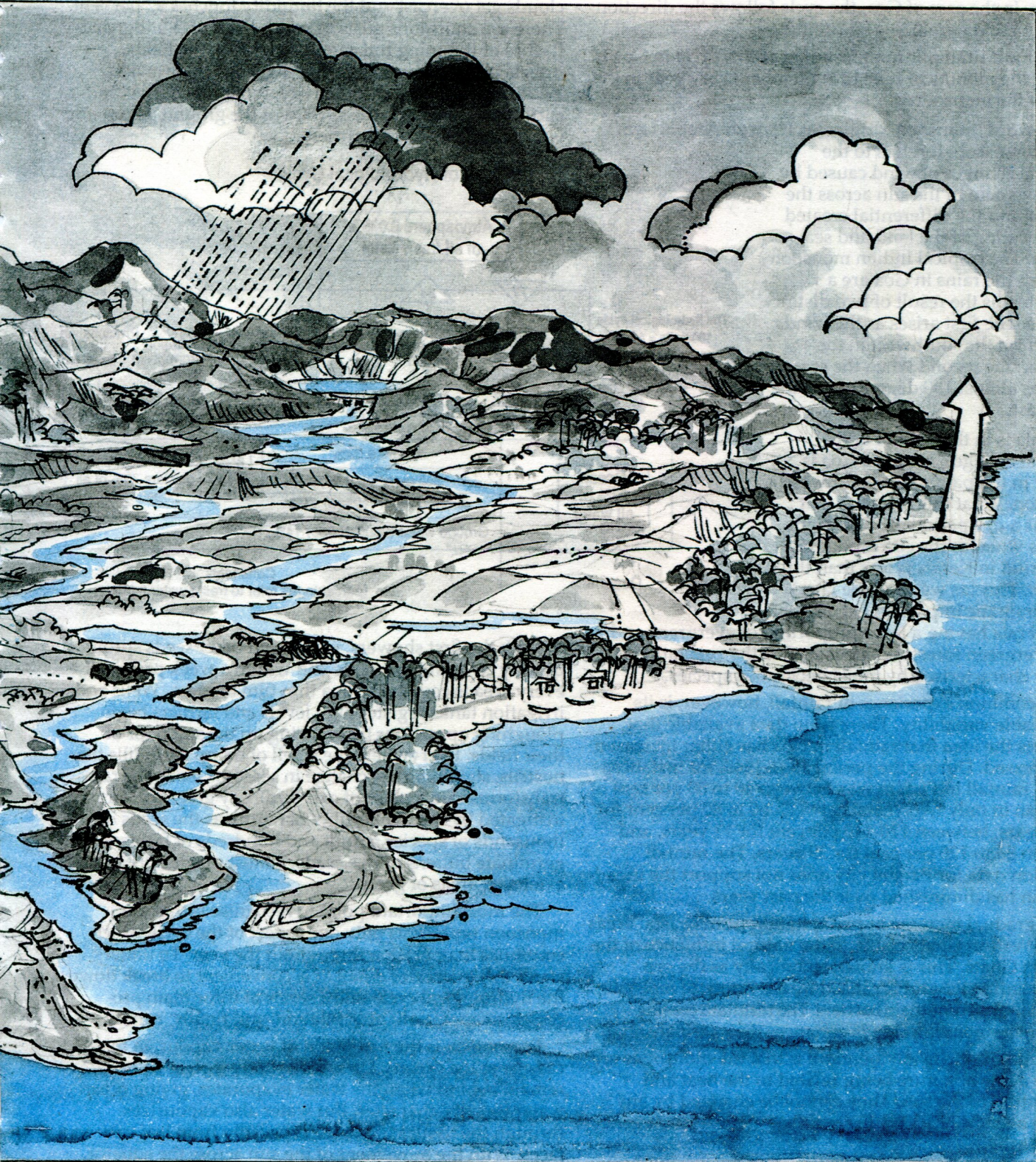
There are also abstracts of important papers dealing with the environment in Goa. Though we tried to get the set of papers from the authors and from the Geological Survey of India, we were still unsuccessful at the time of going to press. Notable among these are:

- Environmental studies in Goa: A framework: A.R. Gokul and A.K.R. Hemmady.
- The changing landscape of Goa—Need for environmental planning and management: Arvind Pant, A.K. Srivastava and V.C. Srivastava.
- Iron ore mining and its impact on environmental quality in Dicholi area, Goa: S.T. Sundaram.
- Dune sands of Salcete coast—A study: K. Sriram and K.N. Prasad.

The Hydrological Cycle



and the Goan Ecosystem



THE HYDROLOGICAL CYCLE

It is impossible to understand any of the elements of Goa's ecosystem without first examining its place within the planetary hydrological cycle.

The hydrological cycle refers to the movement of water across the planet's surface, which is in the form of a cycle or loop. In the case of Goa, the cycle follows the direction given in the diagram.

The most dramatic manifestation of this cycle in Goa is during the months of June to September every year in the form of the monsoons.

The word 'monsoon' originates from an Arabic term meaning season. It refers to the seasonal changes of wind caused by the movement of the sun across the equator and the differential created in the heating of the land and sea masses. The tropical Indian monsoon of which the rains in Goa are a subsystem is the result of two distinct seasons. The first arises as the winds move from the southwest in the summer, the second when the season reverses almost 180 degrees from the northeast.

Kerala is in the path of both seasonal changes, whereas Goa is largely in the path of the southwest monsoon. What this means is that Goa has a dry period of six to eight months whereas the corresponding dry period in Kerala is less than three months. This (as we shall see later) has a dramatic impact on vegetation, with Kerala having a large proportion of evergreen and semievergreen forests whereas in Goa the vegetation is largely characterised by moist deciduous species.

The common experience of rainfall, however, is its remarkable variability. There is no data available that supports the idea that rainfall in Goa has either increased or decreased. During the period 1901-1960, for instance, annual rainfall in Panjim was between 40 to 60 per cent of the mean in only two years; between 60 to 80 per cent for eight years; between 120-140 per cent for 11 years, and between 80 to 120 per cent for 39 years. The rainfall collection data for Panjim city does not support the idea that rain has diminished over the past years.

The gradual increase in precipitation from coastal areas to the Western Ghats is due to the natural influence of the Western Ghats. This is known technically as the orographic influence and is caused by the lifting of moist air as it encounters mountain barriers. The resultant cooling effect on the monsoon clouds enhances their condensation.

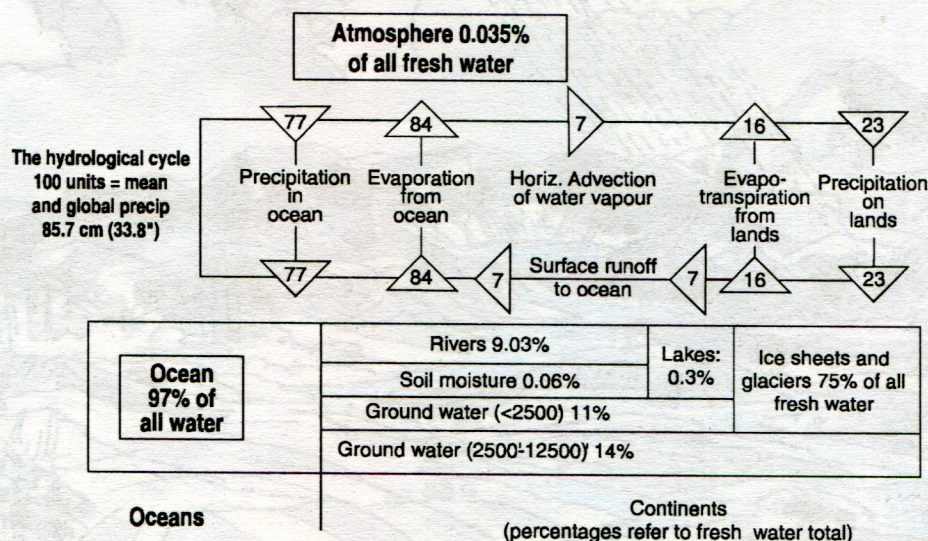
The main conclusion therefore is that the monsoons are largely a law of nature being related to the heat and momentum of the sun. They cannot be changed by any human agency. No one can stop them nor can any agency improve them.

The months immediately prior to the monsoons in Goa are converted into a time of hectic activity. Labour is at a

premium as roofs are repaired and thatches (*pakadis*) are installed in *balcaos* and over windows. Along the sea-shore, the fishing season comes to a halt as the sea becomes turbulent. Fishing gear and craft are kept in protective sheds, fields are fired to remove weeds and grasses, women carry piles of wood for burning in the rainy months and drying of fish and mango kernels are carried out as provisioning for the rains.

The monsoon has a distinct appearance over Goa as the clouds get overcast and the humidity touches 97 per cent. There are enormous gusts of wind, claps of thunder and flashes of lightning roll across the sky. In the fields, insects proliferate and hibernating frogs come awake. White ants increase their activity under wood piles and earthworms move to the surface of the ground. Glow worms appear out of nowhere.

Diagram of Hydrological Cycle



With the first showers, weeds and other seeds sprout quickly covering the fields and within a week practically every area is covered with a thin film of grass. Wells and irrigation tanks register high levels and farmers begin ploughing operations by breaking up the soft floor of their fields. Everywhere the smell of damp earth fills the nostrils, signalling the change in season. Goa in the rains transforms into a place of extraordinary greenery, largely instigated by the rich fertility of nature as the seeds of thousands of species sprout and hundreds of farmers germinate billions of rice seeds, almost magically creating extensive areas of green.

The most important point to recognise is that the monsoon represents only one aspect of the cycle which continues in operation throughout the year. To understand this in greater detail, it is convenient to break down the hydrological cycle into a series of three main processes: evaporation; precipitation; and finally, runoff.

Evaporation is the formation of water vapour, in this case from the oceans. Dissolved solids such as salts remain behind when the water evaporates, giving ocean water its salty character. But water also vapourizes through the tissues of plants, especially from leaf surfaces. With the movement of the sun across the equator, this water vapour moves across the land mass.

Precipitation is the actual monsoon and refers to the manner in which the moisture descends to earth. Generally, in Goa, it condenses into liquid (clouds and rain). Rarely, it condenses into solids (hailstones) before it falls.

Runoff is the flow back to the oceans of the precipitation that falls on lands. In this way, the land returns the water that was carried to it by clouds that drifted in from the ocean. Runoff occurs both from the land surface (through the rivers) and from underground water. Rivers are therefore essentially elaborate drainage systems that drain rainwater back to the sea.

large forgotten. Such as collection and harvesting of water from the roofs and individual houses and farms. There are evidences that such methods were extensively used in regions of low-rainfall, like Kutch, parts of Saurashtra, etc. We have heard of the extensive use of the *ery* (tank) culture in south India from the earliest days. That was also a type of harvesting water rather economically. In Goa, people have traditionally used tanks and *tollem* for the same purpose.

But these methods of water conservation have fallen into disuse due to the tendency on the part of colonial power to centralize water management methods, using ideas not suitable to India's tropical rainfall conditions. Colonial engineers felt they were wiser than the ill-clad local villagers. Apparently the same attitudes still prevail. Modern engineers are Indians with a training in water management suited to the western mid-latitude countries.

MONSOON WATER

Every year, during the monsoons, 320 million hectare metres of water descend on the Indian subcontinent. If all of this rainfall were collected, it would form a sheet of water one metre thick over our landmass. It is the largest volume of its kind that falls anywhere in the world.

Yet, as the ancient saying goes, though there's water, water everywhere, there's not a drop to drink. We have become a nation of water famines and droughts. In Goa, traditionally supplied by an excellent system of wells, water shortages have repeatedly provoked people to come out on to the streets and protest in front of Ministers' bungalows.

In this fascinating essay, Dr. P R Pisharoty, the father of remote sensing via satellite in India, and one of the country's most respected meteorologists, provides reasons why we are losing out on the water front, and the ecological consequences of relying on western-oriented technology, particularly dams like Selaulim, Anjunem and Tillari.

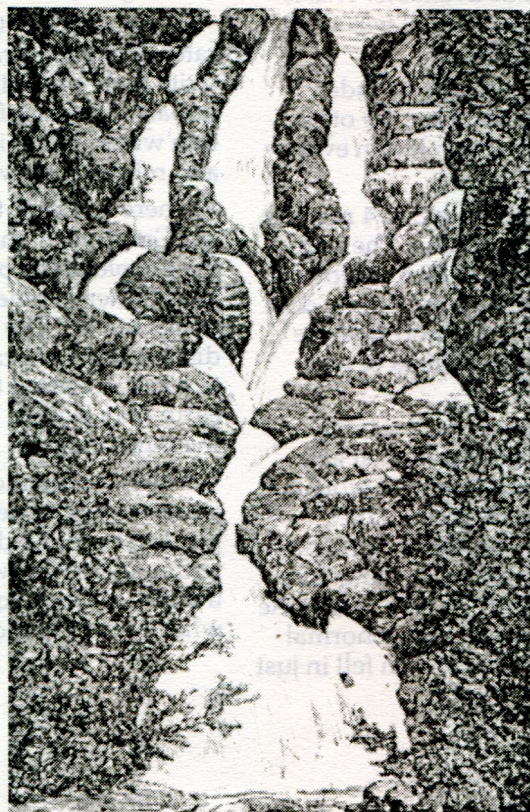
Dr. Pisharoty was Professor Emeritus at the Physical Research Laboratory in Ahmedabad. He was also President of the Association for the Propagation of Indigenous Genetic Resources (APIGR).

Through the monsoon, India receives the largest quantity of rainfall anywhere in the world. Why then are we facing endemic water shortages, droughts and water famines?

Because we are not practising the method of efficiently using all the rainwater that falls on the ground. We are depending too much on modern technology, like dams! Perhaps the population was sufficiently low in the earlier days that special methods were not needed over the major part of the country to collect water. And industrial needs for water too were not there a hundred years ago.

However, in the areas of India where the rainfall has been low and the year to year vagaries high, people had developed innovative methods which have been by and

Dudhsagar waterfalls (in 1871)



Dudhsagar waterfalls today



Rainfall in mid-latitude countries is almost uniformly distributed over all twelve months of the year. And the winter rain is mostly in the form of snow which remains on the ground for long periods. Another factor is the low intensity with which the rain falls, in the form of small water droplets. These are further cushioned by green cover, and allowed to seep into the ground.

However, in our latitudes, particularly in monsoon regions of India, like Goa, about 95 per cent of total rainfall occurs in a short period of 3 to 4 months, during the summer. And this rain occurs in the form of heavy showers with raindrops on the average 10 times bigger than the raindrops of the mid-latitude countries.

There are two major consequences of this: 7 to 8 months of the year, large tracts of the country are rainless. Part of this is a hot season: March to May in some parts as in Goa, March to June in northern parts. So the water that falls during the monsoon period loosens the soil and runs off the surface, filling *nallahs* and channels with valuable silt, and finally via the river system ends in the sea.

Therefore, although our rainfall is more than 100 cm over almost three fourths of the country, about 60 per cent of it is wasted as runoff, there being naturally little time for the water to percolate into the ground. And what little percolation there is, comes up to provide the evaporation losses during the hot rainless months.

In other words, although our rainfall is 100 cm, our effective rainfall when not properly harvested or husbanded is only 20 to 30 cm.

In the older systems of India, the water collection and husbanding methods were such that there were subdued evaporation losses—therefore, about 80 per cent of the rainfall (80 cm) was collected or made available. This is equivalent to saying that the effective rainfall was of 80 cm instead of 20 to 30 cm, as it is today.

These problems are not faced by the mid-latitude countries. In addition, for the latter, there are the other advantages like lower temperatures which lessen evaporation.

Now, when I say that the rainy season is 3 to 4 months, it does not mean that all 120 days it's raining. The number of days with rainfall is of the order of 50 to 60 for the whole country. That is, on any given day, on a rainy day, we get about 2 cm of rainfall, while in the mid-latitude countries, on a rainy day, only 2 to 3 millilitres of rain falls.

We know something more: half the annual rainfall occurs in about 20 per cent of the total duration at any place. In other words, half of the annual rainfall would occur in about 30 hours distributed within the rainy season. In Ahmedabad, for instance (rainfall 82 cm), half the rainfall would occur in about 16 hours. In Bangalore (annual rainfall 92 cm) within 20 hours. In 1987, when the annual rainfall at Ahmedabad was much below normal (69 per cent deficient), half the total annual rain fell in just seven hours.

The impact of the heavier raindrops enables larger amounts of fertile soil to be washed away and this tends to fill up the reservoir basins of dams faster than what foreign engineers expected. (This has already begun to happen in a big way in the case of the Selaulim and Anjunem dam reservoirs).

It may be mentioned that the ancient water conservation system of the land made provisions for the collection of silt in the shallow basins of the *erys* and for putting this back on the soil.

Today, we must adopt one simple principle—to reverse this inappropriate water management system of the past couple of decades which is based on large dams. We must not allow any water to get out of the area in which it falls. Unless, in times of torrential rains, when it is difficult, collect whatever falls on your head. Bund every bit of land from all sides. If this is done, the amount of water lost to the seas decreases considerably, and the effective rainfall becomes 3 to 4 times what it is today. The water will percolate into the ground instead of running off, and can then be utilised.

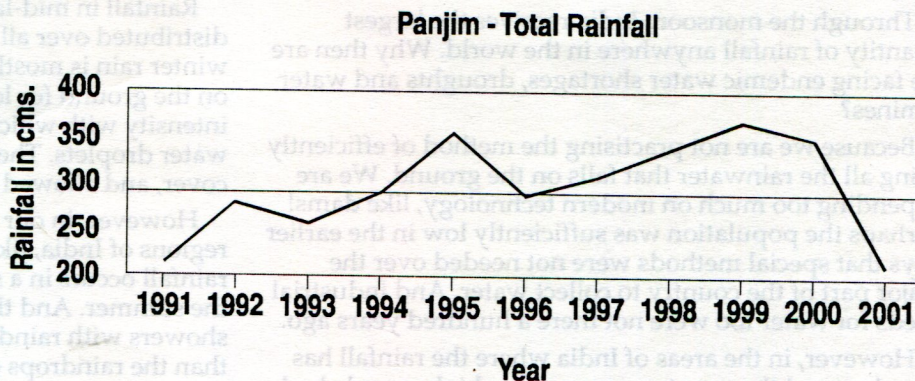
The absence of trees also diminishes the percolation rates. The runoff rate and the soil erosion rate become quite high where there is no forest cover to arrest the impact of the rainfall. The trees break the impact of the rain water, retain it on the leaves, branches, trunks, root and release it slowly to the ground.

There has been the legendary story of Bhagiratha who got Ganga from the heavens for quenching the thirst of the people of the plains of north India. The Ganga told him: 'When I come down, who will withstand the impact of my water?' The legend says that Lord Shiva with his dishevelled hair, caught the impact of the Ganga falling to earth, collected the water in his hair and let it to the earth only slowly. Trees are like Lord Shiva: his hair is the forest canopy.

It may be mentioned that like *erys* and artificial rain-water storing systems, a tree by itself has an ability to prevent runoff and to store the water underground within its root network. This is one of the reasons why the loss of forest cover has made the runoff more than what it was a few decades ago.

Panjim : Total Rainfall (in cm)

Year	Monsoon (June-Sep.)	Annual
1991	209	211
1992	270	278
1993	231	256
1994	256	289
1995	325	356
1996	265	288
1997	280	308
1998	318	337
1999	313	368
2000	315	351
2001	187	213



Deforestation and Rainfall

When PWD engineers wanted to reopen the Mandovi dam project (which was rejected by the Ministry of Environment and Forests because the dam's reservoir would submerge a huge forest), they developed a new argument: 'Trees do not bring rain,' they said. 'Mumbai does not have any trees. Yet it continues to have rain.'

The tropical monsoons are the result of a natural series of events which cannot be disturbed by man. The arrival and departure of the monsoons are connected with the movement of the sun, its heating of the land and sea masses and the

consequent movement of air currents. Deforestation, therefore, cannot kill the monsoon: this much is common sense. However, PWD engineers are being perverse if they claim that forests have no role in precipitation or in the alteration of microclimates.

Dr. Meher-Homji, an ecologist based in Pondicherry, recalls a study of Chhota Nagpur which revealed that when the place had a large area under forest towards the turn of the century it used to receive frequent afternoon (instability) showers during summer which favoured tea plantations. After the destruction of private forests, in spite of no apparent reduction in monsoon rainfall, the instability rains decreased to such an

extent that the tea gardens disappeared. Meher-Homji reasons that it may not be the absolute decline in the monsoon rainfall that affects agriculture, flora fauna or town water supply but rather the lack of rains at critical stages.

Meher-Homji makes the point that deforestation increases the intensity and decreases the duration of tropical rainfall, enhancing runoff, even if the mean rainfall remains unchanged. In other words, the same amount of rain falls but in large quantities and over a fewer days, instead of being spread less voluminously through several days.

This means spells of dryness, increase in forest fires and, of course, soil erosion.

RIVER SYSTEMS

Rivers are the cradle of civilisation. From time immemorial, great cultures have flourished only by entering into a sustainable and harmonious relationship with the rivers on the banks of which their foundations have been laid down. Just as the Sapta-Sindhu rivers had played a very rich and varied role in the growth and development of the culture of ancient India, the nine prominent Goan rivers sustain the Goan ecosystem, besides adding beauty and romance to the land.

From the early Stone Age, Goa's river banks sustained the earliest forms of human habitation. The discovery of rare Stone Age carvings in Kevan-Dhadole, Usgalimal of Pirla village in Sanguem and the new discovery of a prehistoric rock bruising of a humped bull on the outcrop of basalt close to a stream near the temple of Ravalnath at Mhavus (Valpoi) has brought Goa onto the map of rock art in India. The first site lies on the banks of the Kushavati, the second on the banks of a Madei stream.

Tiracol, Mandovi, Zuari, Colvale, Sal, Talpona, Saleri, Canacona and Galgibaga are the main nine rivers of Goa. Due to the extent of their drainage areas and the human attraction they hold, these main nine rivers and their 42 tributaries are significant. These rivers are not only the source of potable water but also support the Goan ecosystem. The surface water system of Goa is intimately linked up with their development since they provide irrigation facilities for agriculture, produce biotic and mineral resources, transport ore from the mining areas to the port and ferry people and goods to different parts of the state.

Goa's rivers are tidal and rainfed. The huge volumes of monsoon water fall within the watershed areas and are then drained out through the major rivers to the sea.

The Watersheds — The earlier approach to understanding drainage was by the Basin approach. A basin is defined as an area drained by rivers and tributaries. As Goa has 9 rivers, the earlier maps indicate 9 basins. Hydrology has advanced a little further today and basins have been replaced by a study of watersheds.

A watershed is a line of separation between waters flowing to different rivers, basins or seas. Every watershed will drain to a common outlet point. Watershed management integrates various activities in an area with a view to minimising their impacts and improving the utilisation of water.

The country has been divided into several watersheds which are reflected in the Watershed Atlas of India. Goa falls in the 5th Water source region of the 'B' Cauvery basin of the first catchment (Sharavati to Savitri) and 'B' sub-catchment (Kalinadi to Vaghotan). This area has been classified into 6 watersheds and given the classification Nos. 5B1B1, 5B1B2, 5B1B3, 5B1B4, 5B1B5 and 5B1B6. These 6 watersheds then further subdivide into 67 sub-watersheds which are themselves further subdivided into 139 mini watersheds (approximate area of 10-30 sq km) and 374 micro watersheds (approximate area of 5-10 sq km).

During the monsoons, thus, the river water is largely sweet, but once the monsoon is over, the salt takes over. Wells along river banks become brackish and unpotable.

The other general feature of Goa's rivers is that all of them are tidal rivers to a great distance from their mouth inwards. In some cases, the ebb and flow of tides reaches forty kilometres inland.

Obviously, the salinity factor in the river varies sharply between the monsoon and the non-monsoon periods, and so does the quality of water in wells all along the river banks, which tend to get increasingly saline as the summer months advance.

The rivers pour their water into the Arabian Sea in several areas, completing the hydrological cycle.

The Tiracol River System — The Tiracol river originates in the Karnataka side of the Sahyadris. It moves along the boundary of Maharashtra and Goa except for a small section (including the historic Tiracol fort) at the river mouth on the right bank. The river enters Goa at Patradevi and covers a distance of 27.5 km in Goa before it empties into the Arabian Sea near Tiracol village. The river which is subject to tidal variations moves through the villages of Patradevi, Torxem, Uguem, Poroscodem, Naibag, Karibanda, Deus, Paliem, Kiranpani, Kerim and Tiracol.

The Tiracol's main tributaries are:

Torexem : This is a small *nallah* emerging from hilly areas in western Maharashtra. The stream unites with the Tiracol river at Torxem before which it covers a distance of 3.5 km.

Khadshi : This stream also emerges from the Western Ghats in Maharashtra, enters Goa at Mopa and covers a distance of 8.5 km till it unites with the Tiracol river at Uguem. The *nallah* flows through dense forest ranges of Mopa-Tamboxem. It is this river that supports life in

Mopa, Tamboxem, Fakirpatto and Uguem. Villagers justly feel that the stream will be severely affected by the proposed bauxite mining industry.

Pernem: A small *nallah* which emerges from the dense range of Malpe village in Goa and unites with the Tiracol river at Karibanda. It covers a distance of 3.5 km.

Harmal River — The Harmal river emerges from fairly dense mixed jungle of the Corgao hilly region of Goa from which it flows westward and after a distance of 11 km, discharges into the Arabian Sea at Harmal.

Mandrem River — This river also emerges from the dense mixed cashew jungles of Corgao and after flowing westwards unites with the sea at Mandrem, after covering 8.75 km. It passes through Corgao, Naikwada, Gawdawada, Bidarbag, Marathwada, Junaswada and Mandrem.

Chapora River System — The Chapora has its source in the Ramghat hills in Belgaum district and enters Goa at Ibrampur village and after covering a distance of 31.5 km in Goa, discharges into the Arabian sea at Chapora village. A meandering river, it is flanked by plateau heights and several valleys from which tributaries flow. It also has several islands which are stocked with mangroves, the tidal interference reaching up to the village Sal. The tributaries are:

Sal Nallah: It originates in Maharashtra and joins the main Chapora river near village Sal after a distance of 6.5 km.

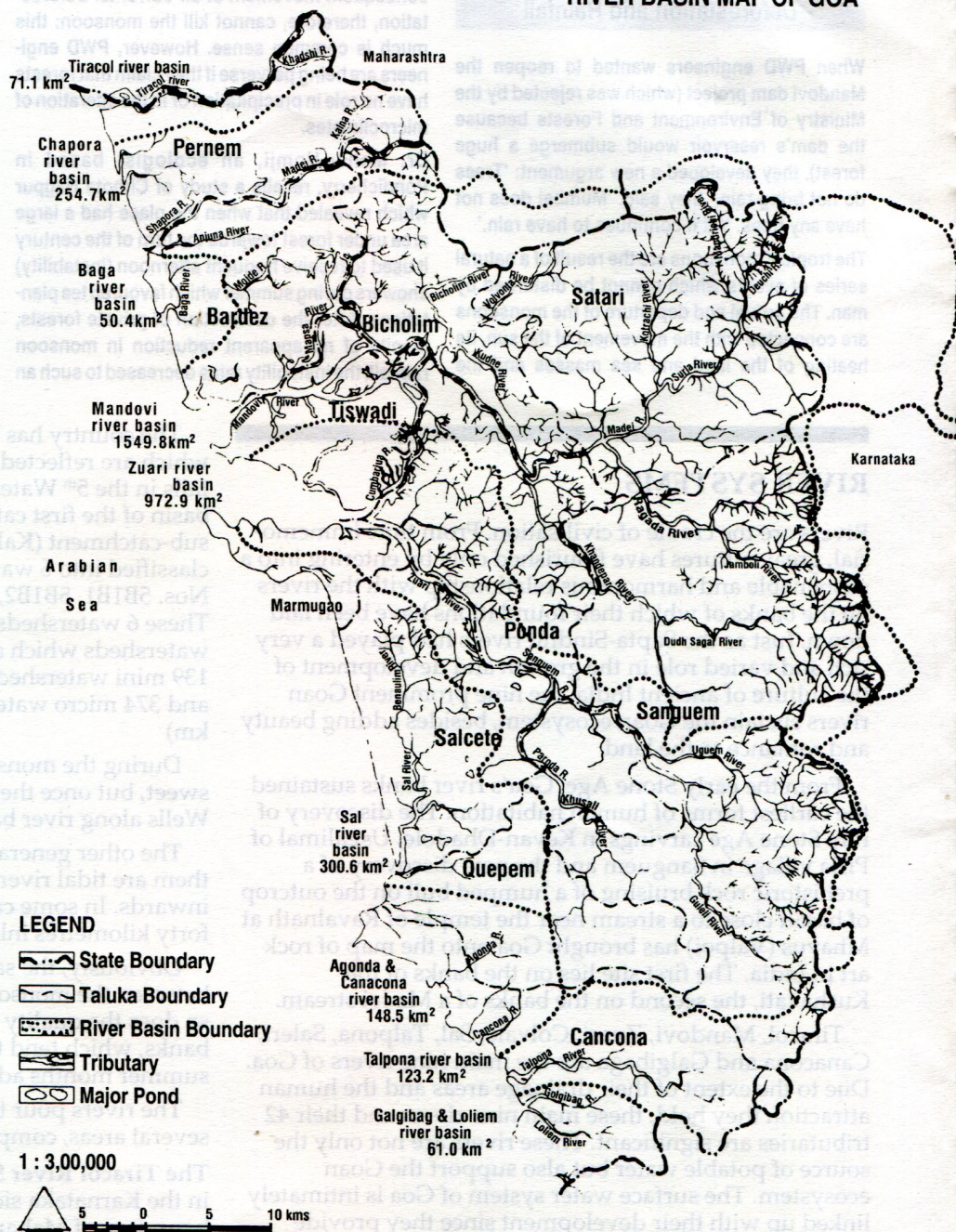
Kalna: A river which emerges from the Western Ghats in Maharashtra enters Goa near village Assapur from where it flows southwards uniting with the Chapora at Taramas. Tidal interference is available upto Bailpur village. The river is 9.5 km long and passes through Assapur, Kristanvadi, Bailpur, Kutwal, Kessarwane, Muryavaddi, and Taramas.

Virnoda: This *nallah* emerges from the Malpe hilly region of Pernem, flows southwards and joins Chapora at Arabo. The distance of 9.5 km is through Virnoda, Malpe, Tivade, Dhargal, Tuem and Arabo.

Parsem: This seven km long river originates from Chiraya village in Pernem and joins the Chapora at Agarwada.

Baga River — The Baga river originates in the dense mixed jungles of Assagao, Bardez. A small stream which comes from the Saligao hilly area joins the river at

RIVER BASIN MAP OF GOA

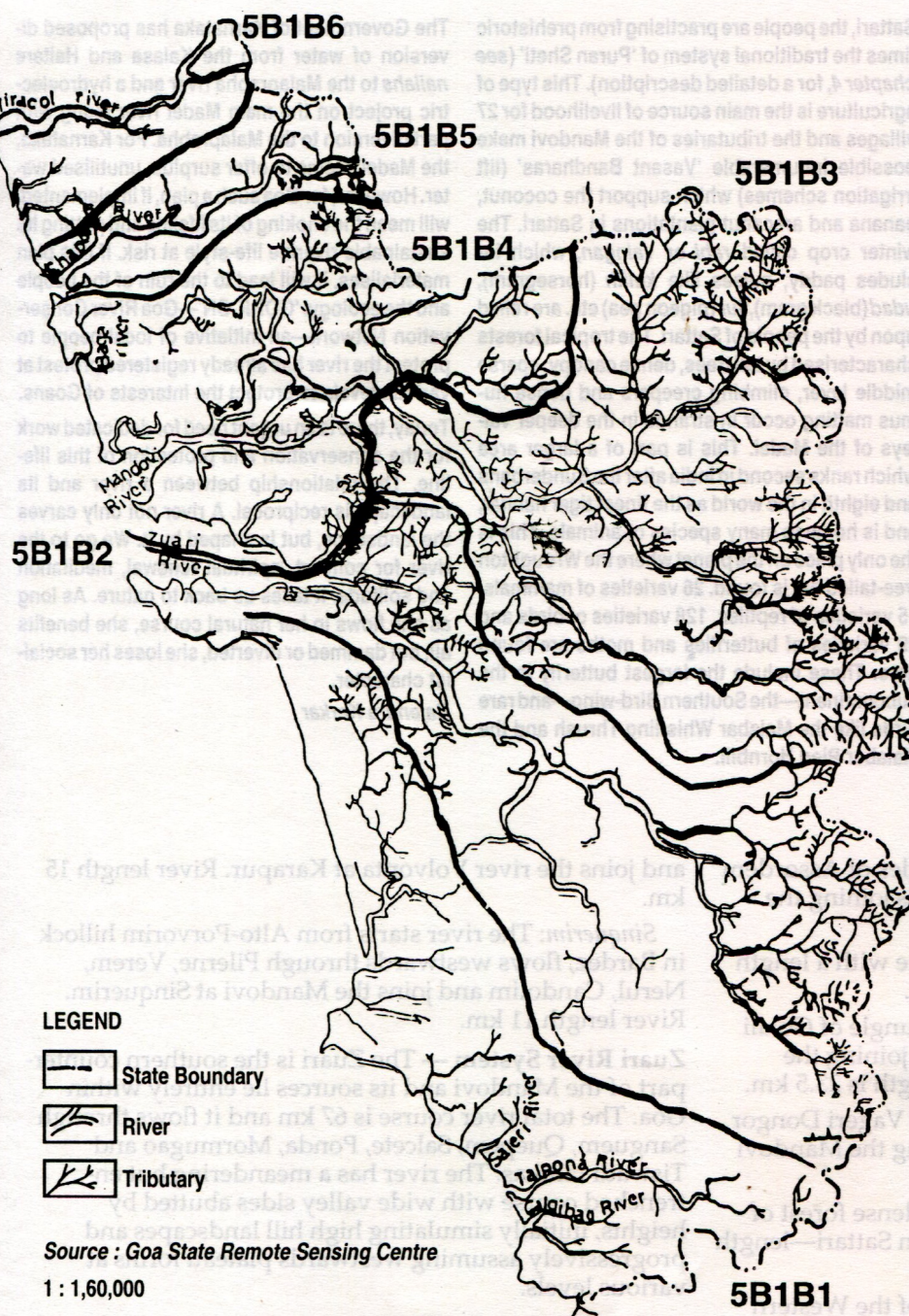


Arpora. The Baga river is 10 km long and flows into the Arabian sea at Baga.

Mandovi River System — The Mandovi, also called the Madei river at its head, rises in the main Sahyadris in the dense forest of Karnataka. The river has the largest drainage basin and the greatest length: 81 km. It is subject to tidal interference upto Ganjem village.

The water course is dotted with several islands. After a rather restricted course through the flat-topped range, the river emerges into a more open valley and from Bembol to Pilgao takes a north westerly course for about 17 km. As the tributaries join in, it develops a broad and slow-moving course, swinging towards the west to meet the Arabian sea. The course is accompanied by remarkable changes in the landscape and drainage. We see the

WATERSHED MAP OF GOA



typical features of a drowned topography with the island of Divar standing prominently in mid-course with its northern counterpart, the island of Chorao, not looking so prominent as an island because it is on the right bank of the Mandovi and encircled by the small but complex network of the Mapusa river drainage.

These and other islands are basically rocky projections of basalt but the land surface has been peripherally extended by heavy siltation upto the present edge of the river water. In fact, the island of Tiswadi like that of Divar is an island with numerous alluvial counterparts in the east, and the Cumbarjua Canal must be regarded as a remnant of a much wider water surface which would in the past have included Carambolim.

Of the tributaries of the Mandovi, the Mapusa network of drainage and that of Khandepar are most important.

Mapusa: The tributary emerges from the dense mixed jungles of Dumacem and Amthane and flows southwards joining the Mandovi at Penha de Franca. The river is 26 km long.

The Mapusa drainage flow to the main river consists of threaded and ill-defined streams in broad, flat and in some places marshy levels, skirted by the Nandoli-Porvorim-Mapusa-Assonora-Sirigao Plateau heights, and shows that the whole low level tract is an infilled alluvium, fed by waters as well as debris by the steep down cutting rivulets of the plateau rims, of which the Assonora stream is the longest.

The Mapusa river has one tributary, the *Moide*, a river which originates in Guirim and flows northeast joining the Mapusa river at Sircaim. It has a length of 17 km.

Khandepar: Runs through a hilly course. It originates in Karnataka, moves through the Castlerock heights and then with the steep ungraded course in the Sahyadris becomes the beautiful Dudhsagar falls. At this stage it is also called the Dudhsagar river. After the Falls, the river runs in a deep valley for some distance till near the village of Colem. Next, as the valley opens out downstream the river meanders joining the Mandovi river near Bembol. The tidal effect is experienced half a kilometre from Oddikarwada. The total length of the river is 25.6 km.

As with the other river valleys of Goa, the Khandepar valley is broad with alluvial embankments. It is also dominated by plateau heights occasionally carrying peaks. The Khandepar, however, has a large drainage area through its tributaries in the south, draining the lands of

north Sanguem and Ponda in its wake.

Calem: The Khandepar itself benefits from its tributary called the Calem *nallah*. The *nallah* starts from Karnataka boundary through dense and mixed jungles of the Western Ghats. It runs westward first till Pimpalquin and then runs practically to the north till it joins Dudhsagar. The stream covers a distance of 29 km.

Smaller tributaries of the Mandovi are:

Nanode: Its source is in the dense jungle of Surla and Concombi in the Western Ghats. The river which is 20 km long has two main streams called Mandrichi Nadhi and Deuchi Nadhi. It joins the Mandovi at Nanode.

Kumbhtol: Emerges from dense jungles of Caranzol area and flows northward joining the Mandovi at Kumbhtol village. River length is 10.5 km.

Madei —The Lifeline of Sattari

Among the nine rivers of Goa, the Mandovi is considered the most important. Earlier, the river was known as the Gomati—which many consider the source of the name 'Gomantak'. As the river sustains the entire resource-rich Sattari taluka, it is popular in Sattari as 'Madei' which means 'Great Mother'. It exerts a profound influence on the life, culture and economy of Sattari and is indispensable to the lives of the people.

The Madei's source is in the Sahyadris of Karnataka, in a remote village Degao near Khanapur. With the Ragoda and the Calem as the main left bank tributaries and Mapusa, Khandepar, Nanode, Kumbhtol, Patwal, Khotodem, Kotrachi, Zarme, Advoi, Volvonta and Sinquerim as the main right bank tributaries, the river has the largest drainage basin in Goa. The length of the river is 81 km and its basin covers an area of 1550 sq kms. Receiving the waters of the Volvonta coming from Ambekhol of Chorleghat and many smaller streams, it develops a broad and slow-moving course. Its swing towards the west to meet the Arabian Sea is accompanied by remarkable changes in the landscape and drainage.

For the people of Sattari, the Madei makes life possible by supplying them with fresh water. In

Sattari, the people are practising from prehistoric times the traditional system of 'Puran Sheti' (see chapter 4, for a detailed description). This type of agriculture is the main source of livelihood for 27 villages and the tributaries of the Mandovi make possible innumerable 'Vasant Bandharas' (lift irrigation schemes) which support the coconut, banana and arecanut plantations in Sattari. The winter crop called *rabi* or *vaingan*, which includes paddy, pulses like *kulith* (horsegram), *udad* (black gram), *tur* (pigeon pea) etc. are relied upon by the people of Sattari. The tropical forests characterised by tall trees, dense canopy, sparse middle layer, climbing creepers and dense humus matting occur in strands in the deeper valleys of the Madei. This is part of a larger area which ranks second in India after the Sunderbans and eighth in the world as the finest tiger habitat, and is home to many species of animals. This is the only place on the planet where the Wroughton free-tailed bat is found. 26 varieties of mammals, 15 varieties of reptiles, 128 varieties of birds and 29 varieties of butterflies and moths are found here. These include the largest butterfly in the subcontinent—the Southern Bird-wing—and rare birds like the Malabar Whistling Thrush and the Malabar Pied Hornbill.

The Government of Karnataka has proposed diversion of water from the Kalasa and Haltare *nallahs* to the Malaprabha river and a hydroelectric project on the main Madei river along with part diversion to the Malaprabha. For Karnataka, the Madei seems to offer surplus, unutilised water. However, for Goa such a plan, if implemented, will mean the choking of its lifeline and putting its sustainable riverine life-style at risk. If this plan materialises, it will lead to the ruin of the people and the ecology. 'GORICON'—Goa River Conservation Network—an initiative of local people to protect the river has already registered protest at various levels to protect the interests of Goans.

Today, there is an urgent need for dedicated work for the conservation and protection of this lifeline. The relationship between a river and its landscape is reciprocal. A river not only carves the landscape, but is shaped by it. We go to the river for comfort, spiritual renewal, meditation and solitude. It takes us back to nature. As long as she flows in her natural course, she benefits all; but dammed or diverted, she loses her socialist character.

Rajendra Kerkar

Patwal: Source in the dense mixed jungles of Assordem and Sirsodem and flows 10 km westwards joining the Mandovi at Barajan in Sattari.

Khotodem: Originates for Malpem jungle with a length of 9.75 km joining Mandovi at Khotodem.

Kotrachi: A river sourced in the dense jungle of Golali and Ivrem-Budruck. It flows southwards joining the Mandovi at Velguem in Sattari. River length is 23.5 km.

Zarme: Originates in the open jungle of Vageri Dongor and flows southwards for 11.25 km joining the Mandovi at Massordem in Sattari.

Advai: A river which originates in the dense forest of Ovalem joining the Mandovi at Vantem in Sattari—length 8 km.

Ragoda: Originates in the dense forest of the Western Ghats, flows westward and over a distance of 35 km, joining the Mandovi at Guleli. The Ragoda has itself a tributary called the Jamboli. The Jamboli starts at the Karnataka border, runs practically westward till Jamboli and then northwest till it joins Ragoda near Surla. River length is 12 km.

Volvonta: Its source is in the Western Ghats of Maharashtra. It enters Goa at Shirol and flows south and after a distance of 21.5 km joins the Mandovi at Sarmanas. The river is subject to tidal interference upto Sanquelim. Three tributaries discharge their water into it. **Costi**, which has its source in the dense forest of Ponsuli, Kalavade: length 8.5 km. It joins the Volvonta at Ghoteli. **Cudne:** its source is in the dense jungles of Buipal. The river joins the Volvonta at Karkhajan after a distance of 17 km; and **Dicholi**, which emerges from the Western Ghat region in Maharashtra, enters Goa at Kudchirem

and joins the river Volvonta at Karapur. River length 15 km.

Sinquerim: The river starts from Alto-Porvorim hillock in Bardez, flows westwards through Pilerne, Verem, Nerul, Candolim and joins the Mandovi at Sinquerim. River length 11 km.

Zuari River System — The Zuari is the southern counterpart of the Mandovi and its sources lie entirely within Goa. The total river course is 67 km and it flows through Sanguem, Quepem, Salcete, Ponda, Mormugao and Tiswadi talukas. The river has a meandering but entrenched course with wide valley sides abutted by heights, initially simulating high hill landscapes and progressively assuming westwards plateau forms at various levels.

The river is also called Sanguem river up to Sanguem. Two major streams, the Uguem and the Guleli, join at Sanguem to form the Zuari river. The tributaries are:

Uguem: It starts from Karnataka boundary and is itself fed by one tributary.

Panchamal Nallah. This *nallah* originates in the dense mixed jungles near Dargin and Panchamahar and runs southwest till it joins the Uguem river near Uguem after a distance of 5.5 km.

Guleli: It also starts from Karnataka boundary and runs westwards through mixed jungles for about five km and then changes direction northwest till Netorli. After Netorli it runs north joining the Sanguem river at Sanguem. Tidal effect is felt around 3.8 km upstream of the confluence point at Sanguem. Length of the Guleli is 41 km. The Guleli itself has three tributaries.

Netorli: It starts from the dense mixed jungles near Verlem and runs north till it joins the Guleli running through Adukune, Netorli. *Nallah* length is five km.

Cumbhari Nallah: It originates from Khadri mountain and runs west upto Cumbhari. Then southwest upto Gaonkarwada and then joins Guleli near Jayamol—length 11 km.

Chirkanali Nallah: It originates in the dense mixed jungles of Nagerwada and runs through Chirkanali, Karmaliwada, Gotmarad before it meets the Zuari at Xeldem. *Nallah* length is 12 km.

Kushavati: It starts from dense jungles near Nune and runs through Danoli and Quepem and joins the Zuari river near Xelvon. Tidal effect is experienced upto Avedem. River length is 45 km. The Kushavati is probably the main tributary of the Zuari. Its drainage area is large and what is more important consists of good stretches of alluvial land, studded with subdued plateaus here and there with the Chandranath hill in prominence. The Kushavati itself has two tributaries.

Gocoldem Nallah: which originates from the dense mixed jungles of Charl, Kajugao, runs through village Gocoldem, passes village Mayan and joins the Kushavati near Rivona. River length 14 km.

Cavorem Nallah: It originates in dense mixed jungles near Cavorem and joins the Gocoldem *nallah* via Molem after a distance of four km.

Santana: It starts from Santana hillock in Tiswadi and joins the Zuari at Siridao. River length nine km.

Sal River System — The Sal originates near Verna and runs southwards to join the Arabian sea at Betul. The tidal effect is experienced upto Kharebandh. River length is 35 km. It has two tributaries:

Navelim Nallah: which originates from St. Jose de Areal runs through fairly dense mixed jungle near Bandalbag and joins the Sal near Davorlim. Distance six km.

Cuncolim Nallah: with its source in the open jungle near Bali and runs to the north till Sanvorcotto and then further to the confluence point in the western direction. It joins the main river near Assolna village. River length is four km.

Saleri River System — The Saleri originates in the fairly mixed jungles near Barcem and Gocoldem and joins the Arabian Sea near Devakaran. River length is 12 km. It has three tributaries.

Padi Nallah: with its source in the Padi hills. It joins Saleli near Pissondi. Length four km.

Agonda Nallah: Originates from mixed jungles near Gule. It passes through Agonda before it joins the Saleri river. Length is 7.5 km.

Molorem: It starts for Damani hill near Molorem. River length is six km.

Talpona River System — The Talpona (31 km) starts from the dense mixed jungles of Ravona Dongor in between Nane and Kuske. It passes Bhatpal and Astegal, then Partagal and reaches the Arabian sea near Talpona.

Nadke Nallah: Originates from dense mixed jungles near Nadke, joins the main river near Bhatpal. Length 10 km.

Gaondongrem Nallah: Starts from open mixed jungles near Vaul, moves via Chal, Nanem Duttade and

Gaondongrem till the confluence near Panha. River length is 15 km.

Bhatpal: Starts from fairly mixed dense jungles near Carvem and runs southwest before it joins the Talpona near Bhatpal. Length six km.

Khalwade Nallah: Originates from dense mixed jungles near Vauzanwadda and joins the Talpona near Dalem. River length six km.

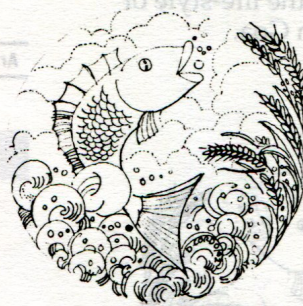
The Galgibaga River System — The main Galgibaga river originates from dense mixed jungles in Karnataka State, enters Goa near Mulem and flows northwest till Poinguinim. It discharges into the Arabian Sea near Maxem. Tidal effect is felt upto Voilowado about 3.5 km upstream. River length is 15 km. It has one tributary.

Maxem: starts from dense mixed jungles near Medal and Bhand and joins the Galgibaga and the Arabian Sea near Maxem. Tidal effect is felt upto Khajalkar. River length is 10 km. It has one tributary:

Lolliem Nallah: which starts from mixed jungles near Tanas and joins the Maxem river near Lolliem. Length 2.5 km.

In times and circumstances of deep ecological harmony between man and nature, the rivers bring life and sustain it. In times of ecological wantonness and degradation, the rivers become also a threat, overflowing silted beds, carrying off precious topsoil and organic nutrients to the sea.

The rivers of Goa are part and parcel of its ecological life. It is our attitudes to them that have changed from friendliness to disrespect. Instead of draining the pure waters that have descended from the sky, the rivers become carriers of sewage, waste and pollutants from settlements and industrial and mining sites to the sea, making life more and more difficult for more and more people, for more generations.



INTRODUCING THE MAIN COURSE

In this chapter, we have attempted to give a broad overview of Goa and its eco-physical features.

In the following chapters, we will now examine more precisely the various eco-regions which together make up Goa.

While doing this, we should keep in mind that though Goa is a part of the Konkan region and shares many physical features in common with it, it is comprised of four principal ecological zones located within three distinct regions. For purposes of a more manageable discussion, we have divided the section on the coastal region into its two constituent ecozones (see map alongside).

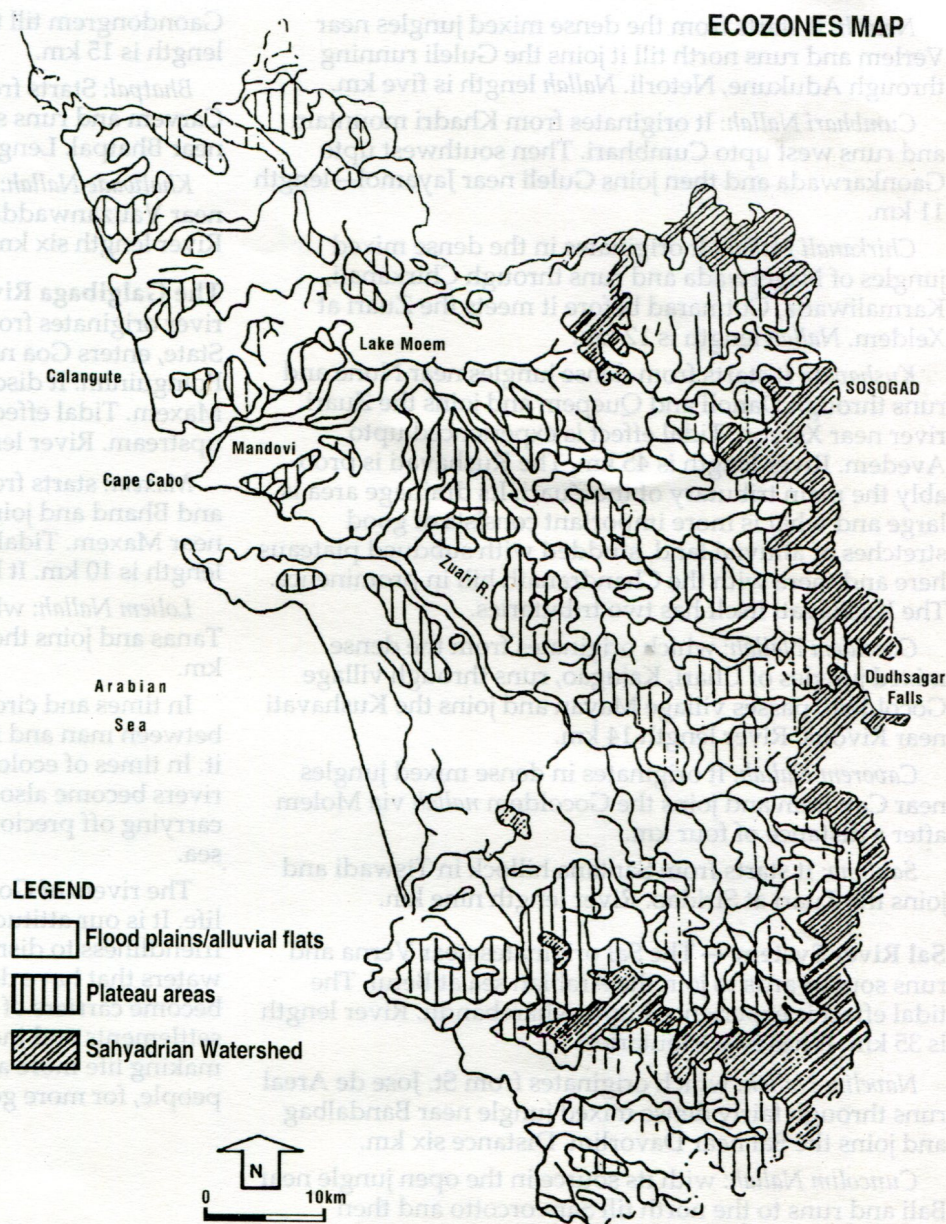
After describing the various ecoregions and their features, and the specific environmental problems associated with each of them, we examine the various other environmental issues facing Goa which do not fit within the bounds of the above physical and geographical divisions.

Throughout, however, we have tried to keep the general picture always in mind, remembering that nature is a whole and it is only the human mind that sees things in fragments and pieces and neat conceptual boundaries.

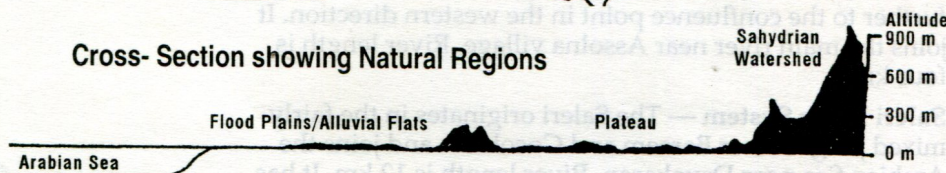
We have ended each chapter with a unique essay (tailpiece) written on some specific aspect of Goan life, taken from a variety of sources or fabricated in-house. These highlight special aspects of the life-style of people who live in Goa.



ECOZONES MAP



Cross- Section showing Natural Regions



Goa's ecozones at a glance

Ecozones

1. Sahyadrian Watershed
2. Plateau areas
3. Flood plains/alluvial flats
4. Coastal ecosystem

Physical Divisions

- Western ghats
- Midland region
- Coastal region
- Coastal region

Fish Curry and Rice (recipes)

We received a large number of letters after the publication of the previous three editions of 'Fish Curry and Rice', with some praising the effort, and others pointing out errors and deficiencies. But one letter simply defied classification: one irate housewife accused us of misleading our readers!

Apparently, the lady's husband had come to Goa to attend one of those never-ending seminars about something or the other. (Goa is a much favoured venue for international and national conferences.) On his last evening here, our gentleman suddenly realised that he had neglected to buy his wife—whom he still loved with an undiminished passion because of her excellent cooking—a gift. He thought for some time and then tottered into a nearby bookstore. Fifteen minutes later, he popped out triumphantly clutching a gift-wrapped package copy of *Fish Curry and Rice*, which he fondly imagined to be a cook book. Before his imagination floated images of his wife serving up the kind of succulent dishes he had been eating for the past few days.

Our hearts go out to anyone trying to concoct a passable meal in the kitchen using this book as a guide. But since mistakes will still occur, and we want to retain goodwill, we decided for good measure to publish a few select recipes on Goan cuisine, principally on how to cook good Goan fish curry and rice.

So here goes. First, a fish curry recipe (good old mackerel, cheaply and plentifully available), followed by another for *balchaun*—a combination of prawns and spices. The recipes are from the book, 'Traditional Taste of Goa' by Kumudini Usgaonkar and Shama Sardesai, one of the best Goan recipe books published recently. We hope you go ahead and buy the book.

Mackerel Curry (Hooman)

Cooking Time: 20 minutes Serves 6

Ingredients:

- 3 large mackerels
- 1 tablespoon chilli powder
- 1 marble-sized ball of tamarind (10 grams)
- 2 medium-sized onions (cut fine)
- 2 cups grated coconut
- 1¹/₂ teaspoon turmeric powder
- 8 peppercorns
- 1¹/₂ teaspoon fenugreek
- 1 tablespoon oil
- Salt to taste

Method:

Cut each mackerel into 5 pieces, apply 1¹/₂ teaspoon salt, marinate for 15 minutes and wash. Grind grated coconut, chilli powder, turmeric powder, peppercorns and tamarind to a fine paste.

Heat oil in a pan. Cut onions fine. Stir-fry fenugreek in the oil. Add onion and fry till golden-brown. Add ground paste along with salt and 4 cups of

water. Bring to a boil. Add mackerel pieces and cook for 3 minutes.

Note of caution:

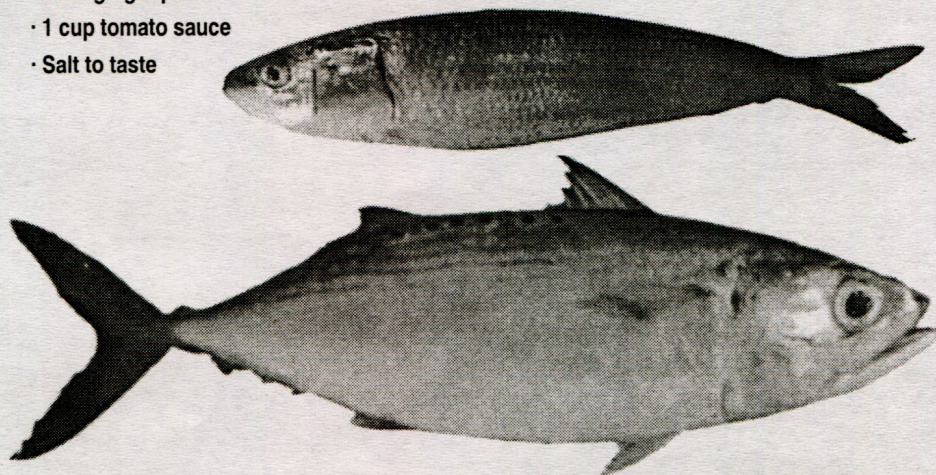
The mackerel pieces should be only be added after the curry starts boiling. After approximately 3 minutes, the pieces that are cooked will float to the surface. This is the sign to remove the pan from the stove. If overcooked, the mackerel will disintegrate.

King Prawn Balchaun

Cooking time: 35 minutes Serves 6

Ingredients:

- 2 cups king prawns (shelled)
- 6 medium-sized tomatoes
- 1¹/₂ cup coriander leaves
- 1 teaspoon turmeric powder
- 15 peppercorns
- 12 cloves of garlic
- 1 teaspoon cumin seeds
- 1¹/₂ cup oil
- 6 medium-sized onions
- 1 tablespoon coriander seeds
- 8 red chillies
- 6 cloves
- Cinnamon stick of 2" cm
- 2 cm ginger piece
- 1 cup tomato sauce
- Salt to taste



Method:

Apply turmeric powder and salt to the prawns and keep aside. Grind coriander seeds, red chillies, cumin seeds, cloves, peppercorn, garlic and ginger to a fine paste. Heat oil in a skillet/wok/kadai and deep fry the prawns till brown. Keep aside. Cut onions fine and fry in the same oil till they become soft. Add ground *masala* paste and fry till the mixture begins to give off a strong aroma. Cut tomatoes into small pieces, add to the mixture in the pan and fry for only a few seconds. Add salt and fried prawns. Cover the pan and cook for five minutes. Then add tomato sauce, mix slowly and well. Garnish with coriander leaves. Serve with bread.

Parboiled rice

The varieties of rice Goans eat with their fish curry are mainly local. These varieties after harvesting are sent through a precooking stage called parboiling. In the local language, one calls this rice *ukdo tandool*. If it is left unpolished, the rice has red streaks on it. People call it 'Goa rice'.

Several varieties of rice were traditionally grown in Goa before the shorter Green Revolution varieties displaced them. The thickest is the round grained, sustaining *curmot*—the common man's food. The *mundu* has a slightly slimmer grain and is the most popular. The finest grained rice is the *suroi*, used in *pulaos*. This variety is not parboiled, but milled to remove all the red coating on the grain.

The process of parboiling makes the rice more nutritious. The technology is fairly simple: women in every village in Goa can be found during specific periods boiling husked rice in a huge copper or mud vessel. The rice is first cleaned and empty husks thrown out. The remaining empty husks pop up when boiled. After a specific interval, the precooked rice is spread out on a wide mat in the sun to dry. After the process, the rice is sent for milling. Some consumers want all the bran removed. Others insist that only the husk be removed, retaining the bran: the result is the fat, reddish rice kernels so characteristic of Goa.

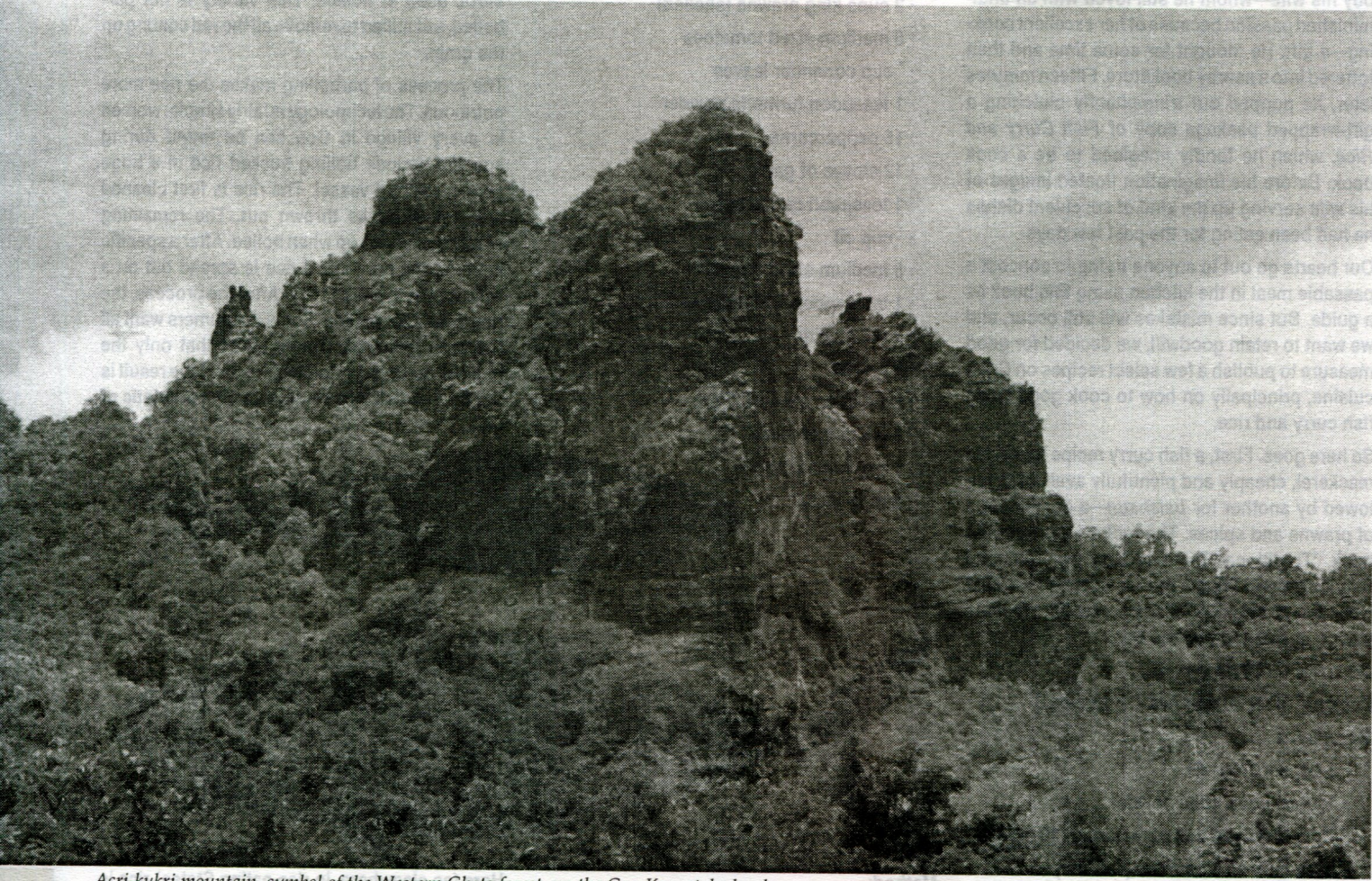
Here (as elsewhere, in rice-eating States) rice is eaten in a variety of forms—*sannas* (steamed rice cakes), *sandon* (steamed rice cakes with savoury or sweet filling), *coyloyeo* (rice flour griddle cakes), *apa de arroz* (rice chapati) and *chitiaps* (rich rice pancakes) being among the better known.

Though most traditions have gone out of the window, Goans still prefer to have the traditional parboiled rice with their fish curry. Parboiled rice is best when it is of the *curmot* variety.



The Western Ghats are one of the richest reservoirs of biodiversity in the world. The sections that lie within Goa (the Sahyadris) and which dominate its ecosystems readily reflect this bewildering complexity in plant, animal and bird life.

Official recognition of the ecological value of this area has come in the form of gazette notifications declaring huge areas as sanctuaries or biosphere reserves. In the year 2001, a confederation of environmental NGOs from Goa, Karnataka and Maharashtra proposed the creation of a new protected area, the Sahyadri Ecologically Sensitive Area or SESA, to be notified by the Ministry of Environment and



Acri-kukri mountain, symbol of the Western Ghats forest, on the Goa-Karnataka border

The Western Ghats Ecosystem

Method:
Cut each mackerel into 2 pieces, apply 1 teaspoon salt, marinate for 15 minutes and wash. Grind grated coconut, chilli powder, turmeric powder, pepper and tamarind to a fine paste. Heat oil in a pan. Cut onions fine. Stir-fry fenugreek leaves. Serve with bread.

Method:
Apply turmeric powder and salt to the prawns and keep aside. Grind coriander seeds, red chillies, cumin seeds, cloves, pepper, garlic and ginger to a fine paste. Heat oil in a skillet. Fry the prawns till brown. Fry the mixture before to give off a strong smell. Add salt and fried prawn. Cover the pan and cook for five minutes. Then add tomato sauce, mix slowly and well. Garnish with coriander leaves. Serve with bread.

Method:
2 cups grated coconut
1 teaspoon turmeric powder
8 peppercorns
1 teaspoon fenugreek
1 tablespoon oil
Salt to taste
Method:
Cut each mackerel into 2 pieces, apply 1 teaspoon salt, marinate for 15 minutes and wash. Grind grated coconut, chilli powder, turmeric powder, pepper and tamarind to a fine paste. Heat oil in a pan. Cut onions fine. Stir-fry fenugreek leaves. Serve with bread.

Forests under the provisions of the Environment Protection Act, 1986.

Clearfelling of trees in the area ceased with the Forest Conservation Act, 1980. Foresters became conservationists. The erstwhile Portuguese regime had rewarded anyone who killed two tigers with a diploma. Today any person doing so faces a 7-year prison sentence.

Due to the destruction of the forests in the past, many communities traditionally residing in these areas have suffered grievously: the Dhangars, the Kunbis and the Velips, the most unprivileged of the human communities in the bioregion. Now that efforts to protect our forests and wildlife are gathering momentum, we must ensure that we involve these forest-dependent communities in the process.

WESTERN GHATS: PEOPLE AND ECOLOGY

Undoubtedly, the most important topographic feature of peninsular India is the Western Ghats range extending along its western margin. The word 'ghat' probably refers to 'gate': distinct passes through which one could cross these mountain ranges. Today, the term is used to describe the entire range of mountains itself.

Due to its mountainous character, often characterised by steep slopes that make parts of its relatively inaccessible, the range has remained relatively undisturbed for much of human history. Partly for this reason, and also because of the unique ecosystem it represents, the Western Ghats are today acknowledged to be one of the 'hot spots' of biological diversity and endemism in the world.

Spread over 0.14 million sq km in the states of Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu, the Ghats support a population of over 35 million people. About five million scheduled tribe and scheduled caste people not only live in the forests of the Western Ghats, but their very survival depends on the natural resources of this tract.

Indirectly, this mountain range influences the well-being of the entire population of the region, by modulating the climate, river water flow, groundwater recharge, adding fertility to river valley and delta soils, and providing a wide range of natural produce for the really impoverished population. Besides this, a very large quantum of raw material for industries such as rayons, newsprint, wood, etc. are also obtained from forests in the Western Ghats. A large proportion of the hydel energy in peninsular India is generated in the Ghats.

All coastal fisheries on the west coast depend on the nutrient discharge into the coastal seas and the subsequent marine productivity. The nutrients originate and are transported by rivers from the Western Ghats.

But the Western Ghats, along with most parts of the country, have suffered extreme environmental degradation. Being ecologically fragile, the damage has often been irreparable and disproportionately severe. The causative factors for degradation range widely from destruction of forests for commercial tree plantations, clearance of large tracts for cultivation, and excessive cattle grazing to unsustainable cultivation practices, leading to a total loss

of the production potential of the land. More recently, extensive road construction (undermining the stability of the hill slopes), industrial mining (iron and manganese ore), urbanisation, population pressure and excessive demand for the limited basic resources such as water, fuel, etc. are also leading to the total destruction of this hill range.

On the whole, age-old cultural practices that would have enabled the sustainable use of the total resource systems of the hills are being transplanted by the alien means associated with 'development', causing widespread destruction.

Lack of proper understanding of what constitutes a sustainably utilisable resource, the absence of scientifically tested and proven methods of exploitation and the lack of social institutions to manage the natural resources are the major drawbacks faced in natural resource management. Conventional models of development do not take into account the constraints and limitations of ecosystems. They also exclude the cultural antecedents of a society that alone enabled them to manage their habitat sustainably. Application of concepts and procedures which are often only exotic, and theoretical frameworks that are culturally inappropriate, result in the annihilation of the resource base and increase the instability of the human society dependent on that resource. Such a series of errors have cumulatively resulted in an unprecedented ecological crisis, particularly in the 'resource rich', 'fragile but backward' hill areas.

Many ecosystems in the Western Ghats are extremely fragile and so complex that in fact we have not understood their dynamics. But once interfered with, such ecosystems get destabilised and go through a process of retrogressive changes, which are irreversible. Hence, a conservation plan for the Western Ghats automatically becomes an ecosystem conservation plan.

An Overview of the Tract — The Western Ghats start in the north from near the Tapti River and end in the south near Kanyakumari. They are almost parallel to the West Coast and often hardly 40 km from it. Since the Ghats extend along the coast rising up to an average elevation of 900-1500 m above the sea level, obstructing the monsoon winds from the southwest, the geographic effect on the rainfall is considerable. The western slopes of the Ghats receive very heavy rainfall ranging from 2000-6000 mm per year. But across the hill ranges, as one proceeds eastward, the rain decreases and the eastern slopes and foothills are almost rainshadow areas.

The Western Ghats are the main watershed in peninsular India from which all the principal rivers (Godavari, Krishna and Cauvery) originate and flow eastwards, emptying into the Bay of Bengal. A very large number of short, perennial, torrential westward flowing rivers also originate from it and join the Arabian Sea. The average height of the Ghats is less than 1500 m above sea level.

Subregions — Although the Western Ghats extend over 1400 km along the states of Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu, geographically the region is divided into three distinct subregions. The northernmost of these is the Maharashtra Sahyadris extending from the Tapti River to south of Goa, rising up to an elevation of 900 m - 1200 m above sea level.

It is this northernmost segment that concerns us here. The section is composed of Deccan lavas descending steeply to the undulating narrow coast. It has a much-dissected western face cut up by canyon-like valleys into mesas, buttes and pinnacles. To the east of the crest, there are broad, mature or senile valleys on the plateau.

A characteristic of all mountain areas is the non-uniformity of ground conditions. The Western Ghats are no exception. Climate is one wide-ranging variable which is influenced by a variety of other factors. Interlinkages between topography, climate and ecosystems make for a bewildering variety of constantly changing situations, but with some underlying patterns. They present a whole range of gradients, both altitudinal as well as latitudinal. One has to incorporate many variable climatic factors, such as total annual rainfall, peak rainy season period and its duration, number of rainy days, maximum and minimum temperatures and the season of the year when these are experienced, wind velocity, direction, etc. in order to gain a complete picture of the ecosystem in the Western Ghats.

To give a few examples, the southern Western Ghats show an increase in total annual rainfall from south to north, but the spread of the rainy season decreases. In a west to east transect, from the coast to the western face of the Ghats, there is a sharp increase in the total precipitation. Then it decreases across the Ghats sharply towards the east and again slowly picks up towards the eastern coastal stretch. The peak rainy season is June to August along the western face of the Ghats, while it is October to December along the eastern edge of the Ghats. The aspect of individual valleys, the presence of sheltering high ridges especially on the windward side, and other such factors influence the local climate substantially. Hence there is unexpected and drastic local variation in climate within the tract.

Biological Wealth — In peninsular India where maximum anthropogenic modification of ecosystems has taken place, the only remaining islands of relatively undisturbed natural ecosystems are in the Western Ghats. A considerable part of the residual endemic flora and fauna of the peninsula is also concentrated here. The complex topography, high rainfall, relative inaccessibility and biogeographic isolation have helped the Western Ghats retain their biological diversity to some extent—at least until very recently.

Although the flora and fauna of this peninsular hill range show a prominent affinity to the Assam, Malayan and Indo-Chinese biota, there is also at present a very wide variety of exotic naturalised species which were mostly introduced since the advent of European colonialists. There are a large number of tropical American and Australian elements.

Delimited by the sea to the west, the Vindhya and Satpura ranges to the north and the arid Deccan plateau to the east, the Western Ghats are insulated and isolated. Hence the high percentage of endemism.

The very humid climate with an average dry season of four to five months results in many groups of plants and animals showing rich species diversity. Chatterjee (1940), who compared the floristic endemism in India, has estimated that the Himalayas has 3169 species of endemic dicots and peninsular India about 2045, out of which 1500 species are from the Western Ghats.

THE GHATS IN GOA

The part of the Western Ghats (the Sahyadris) lying in Goa covers about 600 sq km out of the total area of the state of 3701 sq km. The average elevation is 800 m. The range extends in the form of an arc for a length of 125 km north to south. The Ghats can be generally seen as a wall on the horizon if one looks eastwards from the plains.

Geologically speaking, the topography is distinctive: the Sahyadrian scarp is quite steep and bold in many places, owing its origins to the major faulting or fracturing which created the Western flank of the Sahyadris as a whole. Many of the hills do not have sharp peaks but rounded summits due to the weathering and the water erosion of an intense monsoon.

Over the entire length of the Western Ghats, the widest belt of forest is around Goa and the neighbouring parts of Karnataka because the rainfall remains relatively high over this tract in view of the comparatively lower elevation of the Ghats here.

The area is naturally a major source region for most of the Goan rivers. Streams, many of which in the steep sections form waterfalls, of which the Dudhsagar is the most spectacular, cut the scarp face in several places.

The local names for isolated peaks are: Sonsagar (3827 ft); Catlanchimauli (3633 ft); Vaguerim (3500 ft); and Morlemchogor (3400 ft). All these lie in Sattari, in the north of Goa. Further south we have Siddhanath at Ponda, Chandranath at Paroda, Consid at Astagar and, finally, Dudhsagar at Latambarcem.

Plant Biodiversity — Being located in the tropics, Goa is characterised by a warm humid climate. The region has lateritic and lateritic clayey-loamy soils. The mean temperature of the coldest month is over 20 degrees C, except in the eastern hilly region where it is lower. Annual average rainfall is over 5000 mm in the eastern part and less elsewhere. The length of the dry season ranges between five and six months. For these reasons, the dominant vegetation is of the moist deciduous type.

The State is bestowed with a relatively rich floristic diversity. Vartak (1966), in his *Flora of Gomantak*, has recorded a total of 1512 species of plants (including 49 ferns), over an area of 3282 sq km.

The figure speaks for the rich floristic variety represented in the State.

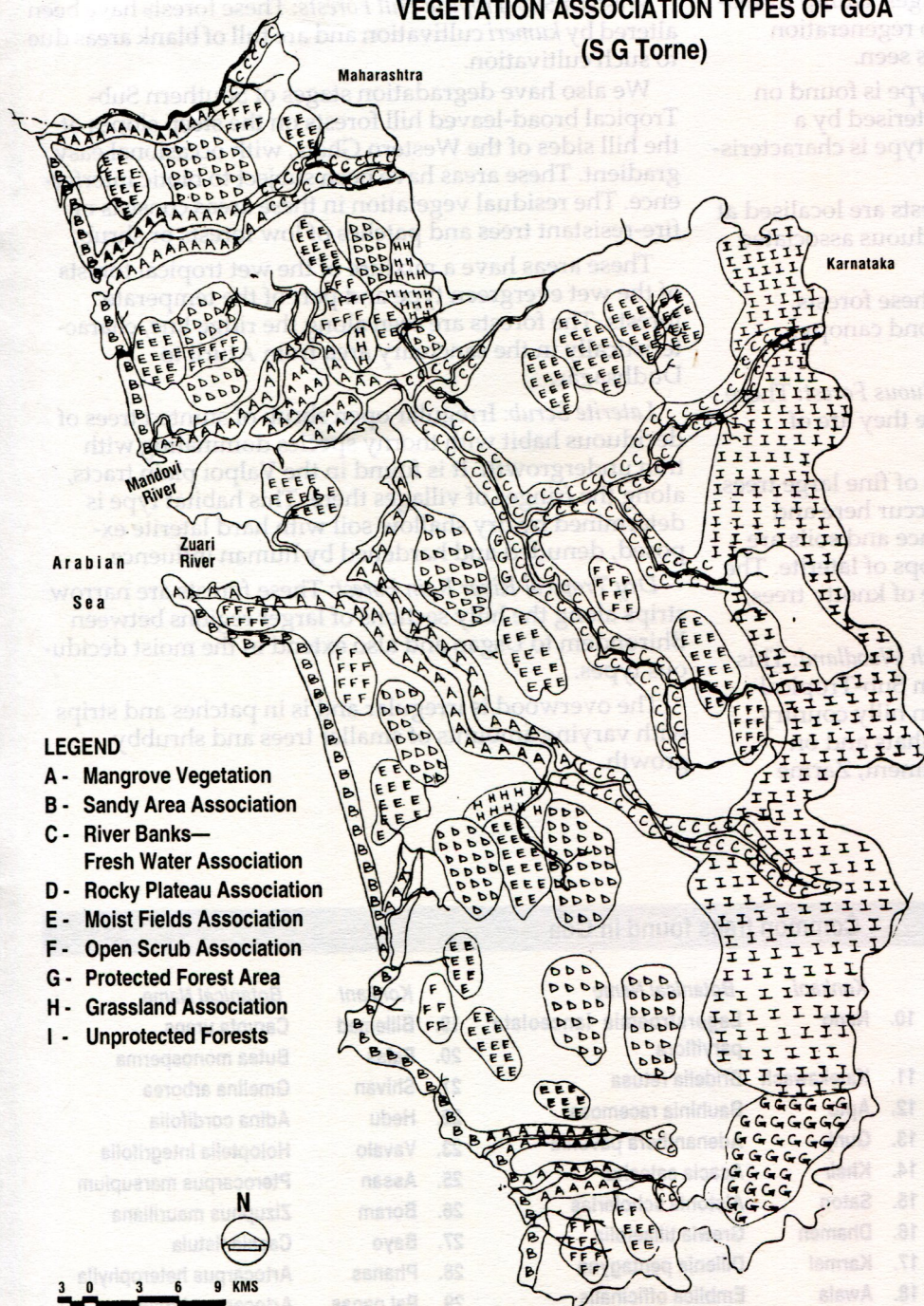
Dr. S.G. Torne of Chowgule College, Margao, has recently drawn up a vegetation map of Goa with the assistance of Henry N Nyabuto. The map is reproduced alongside.

Much before Torne, the Goa Forest Department also prepared an elaborate listing of botanical species—some 830 of these are listed in the Department's Working Plan for the North Goa Forest Division. The Botanical Survey of India, Kolkatta, has also prepared an encyclopedic volume on the *Flora of Goa*, which is reviewed elsewhere in this book.

We are relying here on the classification of forest types used in the Working Plan document, which is as follows:

West Coast Tropical Evergreen: This type occurs all along the favourable areas of the Western Ghats, along *nallahs*, streams and where soil is deep as Residual Patches.

VEGETATION ASSOCIATION TYPES OF GOA (S G Torne)



Floristic Diversity

Floristically, the Western Ghats bioregion is one of the richest areas in the country, harbouring no less than 3500 species of flowering plants (which is 27 per cent of flowering plants in the country). There is an equal, if not richer, proportion of lower plants.

The ten dominant natural orders of plants in the Western Ghats are: *Gramineae*, *Leguminosae*, *Acanthaceae*, *Orchidaceae*, *Compositae*, *Euphorbiaceae*, *Rubiaceae*, *Asclepiadaceae*, *Geraniaceae* and *Labiatae*.

The genera found in the region with more than 15 species each are:

Crotalaria, *Impatiens*, *Diospyros*, *Ipomoea*, *Eugenia*, *Strobilanthes*, *Ficus*, *Desmondium*, *Habenaria*, *Grewia* and *Osbeckia*.

There are 58 endemic genera mostly confined to the Western Ghats of which 47 are monotypic.

Gramineae (*Poaceae*) has the highest number of endemic genera and the genus *Nilgiranthus* has the maximum number (20) of endemic species.

Tree genera endemic to the Western Ghats are: *Blepharisternma*, *Erinocarpus*, *Meteromyrtus*, *Otonophelium*, *Poeciloneuron* and *Pseudoglochidion*.

Other endemic genera of the Western Ghats are: *Adenoon*, *Griffithella*, *Willisia*, *Meineckia*, *Baeolepis*, *Nanothamnus*, *Wagarea*, *Campbellia* and *Calacanthus*.

Areas where this type is seen characteristically in large blocks include Pendral, Kadval, Zaranim, Caranzol (Dudhsagar), Boma, Oxel, Sonauli and as a relict type at Vagueri.

Cane Brakes: Mostly localised to the nallahs along the ghat region and extending sometimes in other areas where moisture conditions are suitable, mostly in Valpoi, Collem and parts of Keri and Ponda (Nirancol).

Wet Bamboo Brakes: Found at Derodem in a pure patch. It is comprised of *Bambusa arundanacea* and no overwood; in other areas, especially deciduous forest and the semi-evergreen forests, bamboo is mostly found as undergrowth. Young regeneration is gregarious at Bondla and Zadani.

Along some river banks (Dabal), *Ochlandra* reeds occur under an overwood of *Eugenia* and *Pongamia*. In higher reaches Chiva bamboo (*Oxytenanthera*) occurs in sporadic patches (Surla)

West Coast Semi-Evergreen: This type occurs intermingling imperceptibly between the wet Evergreen and moist deciduous forest.

Moist Bamboo Brakes: Found throughout the semi-evergreen and moist deciduous areas. The occurrence of bamboo brakes depends upon soil conditions and they are usually found along stream sides and shady slopes, where openings are available. They occur along with a few stands of *Terminalia* and other trees.

The main bamboo that occurs is *Bambusa arundanacea*. At the moment this bamboo is in the very early stages of clump formation, but in

There are 6 genera and 17 species belonging to *Bambusae* of which 6 are from the Western Ghats.

The Western Ghats are the most important distribution range for many plant families and genera. In the leguminous genus, *Dalbergia* is of economic importance (the very valuable rosewood is from this genus). There are about 100 species reported from all over the world, of which 25 species are from India. Of this, 22 species and one variety are from the Western Ghats.

The Western Ghats has 84 species and two varieties of endemic orchids belonging to 30 genera (three genera are endemic). Of the known orchids of Indian peninsula, 37 per cent are endemic to the Western Ghats region and of these, fifteen species endangered.

certain tracts of Valpoi and Collem ranges, clump formation is much advanced. Where bamboo regeneration occurs, very little other shrub growth is seen.

Lateritic Semi-Evergreen Forest: This type is found on shallow dry lateritic soils and is characterised by a preponderance of *Xylia xylocarpa*. This type is characteristically seen at Shivdem/Poikul.

Slightly Moist Teak Forests: These forests are localised at Morlem, Shiggam and Kalay. The deciduous associated species predominate.

Southern Moist Deciduous Forests: In these forests, deciduous species predominate. In second canopy, evergreen habitat is more developed.

Southern Secondary Moist Mixed Deciduous Forest: These types are found in wetter regions where they are of secondary origin by biotic action.

This type is characterised by absence of fine large trees. A few survivors of the primary forest occur here and there. The forests have a drier appearance and soils are shallow and stony, gravelly with outcrops of laterite. The trees have the characteristic appearance of knotty trees, and coppice growth.

South Indian Sub-Tropical Hill Savannah Woodland: This type is a degradation stage derived from Sub-Tropical Evergreen by clearing or burning seen in hilly country, especially steep slopes of the Western Ghats and on undulating plateaus. (Gululem compartment, Zarme upper slopes).

Western Sub-Tropical Hill Forests: These forests have been altered by *kumeri* cultivation and are full of blank areas due to such cultivation.

We also have degradation stages of Southern Sub-Tropical broad-leaved hill forests on the steep slopes of the hill sides of the Western Ghats, with occasional easy gradient. These areas have been subject to biotic interference. The residual vegetation in these areas consists of fire-resistant trees and patches of low forests or shrub.

These areas have a mixture of the wet tropical forests of the wet evergreen type and part of the temperate forests. The forests are seen along the ridge line, characteristically in the sanctuary area from Aturli to Dudhsagar.

Laterite Scrub: Irregular open shrub of stunted trees of deciduous habit with thorny species dominating with thin undergrowth. It is found in the Valpoi plain tracts, along the fringes of villages there. This habitat type is determined by dry shallow soil with hard laterite exposed, denuded and hardened by human influence.

Dry Tropical River Rain Forest: These forests are narrow strips along the hilly sections of larger regions between Bhirondem to Usgao and also extend in the moist deciduous types.

The overwood is irregular and is in patches and strips with varying amounts of smaller trees and shrubby growth.

Common trees found in Goa

Konkani	Botanical Name	Konkani	Botanical Name	Konkani	Botanical Name
1. Matti	<i>Terminalia tomentosa/crenulata</i> (State Tree)	10. Nano	<i>Lagerstroemia lanceolata parviflora</i>	19. Billemad	<i>Caryota urens</i>
2. Kindal	<i>Terminalia paniculata</i>	11. Katekawach	<i>Bridelia retusa</i>	20. Palas	<i>Butea monosperma</i>
3. Hirda	<i>Terminalia chebula</i>	12. Apto	<i>Bauhinia racemosa</i>	21. Shivan	<i>Gmelina arborea</i>
4. Goring	<i>Terminalia bellerica</i>	13. Gunj	<i>Adenanthera pavonia</i>	22. Heddu	<i>Adina cordifolia</i>
5. Savai Matti	<i>Terminalia arjuna</i>	14. Khair	<i>Acacia catechu</i>	23. Vavalo	<i>Holoptelia integrifolia</i>
6. Sissum	<i>Dalbergia latifolia</i>	15. Saton	<i>Alstonia scholarias</i>	25. Assan	<i>Pterocarpus marsupium</i>
7. Asoka	<i>Saraca indica</i>	16. Dhamen	<i>Grewia tiliaefolia</i>	26. Boram	<i>Zizuphus mauriliana</i>
8. Onwal	<i>Mimusops elengi</i>	17. Karmal	<i>Dillenia pentagyna</i>	27. Bayo	<i>Cassia fistula</i>
9. Vad	<i>Ficus bengalensis</i>	18. Awala	<i>Embllica officinalis</i>	28. Phanas	<i>Artocarpus heterophylla</i>
				29. Pal panas	<i>Artocarpus hirsuta</i>

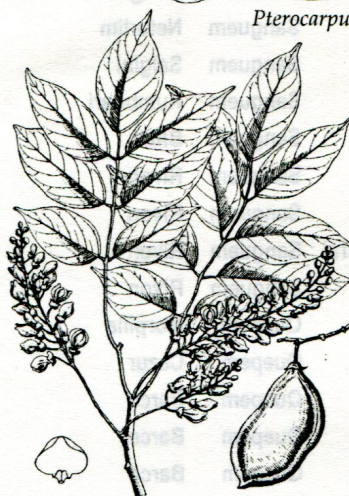


Konkani	Botanical Name
30. Otomb	Artocarpus lakoocha
31. Jamun	Syzygium cumini
32. Nagin	Sterculia foetida
33. Moi	Lansea grandis
34. Kadam	Anthocephalus envamba
35. Kalamb	Mytragyna parviflora
36. Semdri	Mallotus philippinensis
37. Kaidol	Sterculia urens
38. Karanji	Pongamia pinnata
39. Kumbiyo	Careya arborea
40. Kudo	Hollarhena antidysenteric
41. Kusum	Schleichera oleosa
42. Chandado	Macaranga peltata
43. Ambo	Mangifera indica
44. Bibba	Semicarpus anacardium
45. Kalakudo	Wrightia tinctoria
46. Pipal	Ficus religiosa
47. Kadu khajur	Melia composita
48. Bhendi	Thespecia populnea
49. Ran Bhendi	Thespecia lampa
50. Taman	Lagerstroemia speciosa
51. Kharvat	Ficus asperima
52. Sawar	Bombax malabaricum
53. Siras	Albizia lebbek
54. Kala siras	Albizia odoratissima
55. Saguvan	Tectona grandis
56. Tetu	Oroxylum indicum
57. Padval	Stereospermum personatum
58. —	Cedrela toona
59. Zamba	Xylia xylocarpa
60. Elamb	Machilus macramtha
61. Ambado	Spondia mangifera
62. Char	Buchanania lanzan
63. Khasti	Hydrocarpus laurifolia
64. Bibbo	Holigarna arnootiana
65. Oondi	Calophyllum inophyllum
66. Irai	Calophyllum wightianum
67. Bhedas	Syzygium caryophyllatum
68. Karamb	Olea dioica
69. Bavalgi	Vitex altissima
70. Bhiran	Garcinia indica
71. Boke	Bischofia javanica
72. Brev-Damar	Canarium stricture
73. Karo	Strychnos nux-vomica
74. Goinda	Diospyros motana
75. Jagan	Falcouria latifolia
76. Ranjaiphal	Myristica malabarica
77. Kakad	Garuga pinnata
78. Kamdel	Carallia brachiata
79. Kamdeli	Rhizophora mucronata
80. Salai	Aparora lindhyana
81. Lavang	Cinamomum zylaricum
82. Pave	Hopea wightianus
83. Rinte	Sapindus emarginalis

V. T. Thomas



Pterocarpus marsupium



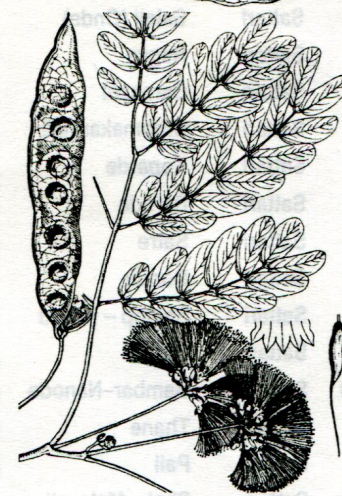
Pongamia pinnata



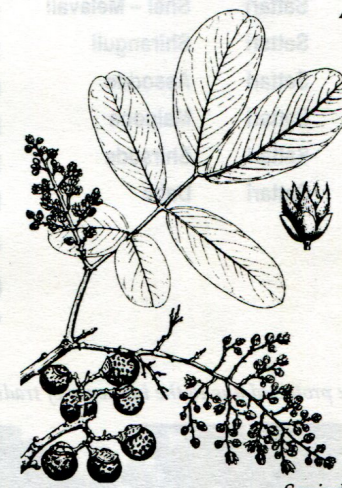
Syzygium cumini



Ficus religiosa



Albizzia lebbek



Sapindus emarginalis

Nature's Jewels

In our everyday life we tread on many jewels, viz. the wild flowers around our settlements, which we tend to overlook. We have a very rich variety of flowers and blossoms, their sizes varying from the big visible blossoms of paper flower climbers to the tiny flowers of the Goat Weed. Many varieties like the Silverspiked Cockscorn, Creat and Carribean Stylo with small beautiful flowers line up along the small lanes. Colorful flowers in vivid blue, yellow and pink belonging to the 'Glory' family adorn even the edges of our highways. On a short walk in the shrubby outskirts of our villages, bright red flowers of jungle flame amongst country mallow and wild ladies fingers

greet us. Playing with the touch-me-not (*mimosa*) plant has been part of our childhood memories. The giant milkweed commonly known as *Rui* is used for religious purposes. Small *jheels* in the countryside are often lined up with beautiful and spectacular flowers of Bearded Comelina. Fierce red and yellow coloured flowers of Glory Lily locked in claw-like formation resemble bloodied tiger claws. A robust shrub of Candle Cassia, originally from South America, shows its presence on Goan sidewalks with bright yellow blossoms.

Every season brings with itself a different range of colours, forms and textures of wild flowers. Let us start noticing these small beauties.

Abhijit & Rashmi Sadhale

List of Sacred Groves in Goa

Name of Grove	Taluka	Location	Name of Grove	Taluka	Location
Rashtroli	Pernem	Gavadewada (Mandrem)	Devachirai	Sattari	Bhironde
Kurlyachi wadi	Pernem	Varkhand	Devachirai	Sattari	Golauli
Shevro	Bicholim	Kharpal	Devachirai	Sattari	Mauxi
Sidhdachirai	Bicholim	Vadawal	Devachirai	Sattari	Ivre – Budruk
Ajobachirai	Sattari	Keri	Devachirai	Sattari	Pendral
Maulichirai	Sattari	Vagheri (Keri)	Avali Dano	Canacona	Cotigao
Pishyachirai	Sattari	Keri	Kuske Dano	Canacona	Cotigao
Sidhdachirai	Sattari	Morle	Badde Dano	Canacona	Cotigao
Devachirai	Sattari	Saleli (Onda)	Paikapann	Sanguem	Neturlim
Devachirai	Sattari	Nagve	Paikapann	Sanguem	Salgini
Holayechirai	Sattari	Caranzol	Paikapann	Sanguem	Kumbhari
Ajobachitali	Sattari	Brahmakarmali	Paikapann	Sanguem	Bhati
Devachirai	Sattari	Koparde	Devadongor	Sanguem	Rivon
Dhupachirai	Sattari	Derode	Vasantagal	Sanguem	Rivon
Devachirai	Sattari	Satre	Patryatali Devrai	Sanguem	Rivon
Poshyachirai	Sattari	Bondir	Vaghryapann	Sanguem	Rivon
Devachirai	Sattari	Shelop – Khurd	Paikapann	Quepem	Morpilla
Devachirai	Sattari	Surla	Paikapann	Quepem	Cazur
Nirankarachirai	Sattari	Bambar–Nanode	Betalapann	Quepem	Barce
Devachirai	Sattari	Thane	Vaghryapann	Quepem	Barce
Devachirai	Sattari	Pali	Gadgyapann	Quepem	Barce
Devachirai	Sattari	Shel – Melavali	Siddhmaddi	Quepem	Barce
Devachirai	Sattari	Shiranguli	Shivapann	Quepem	Barce
Devachirai	Sattari	Assodde	Devipann	Quepem	Barce
Devachirai	Sattari	Malpona	Mahadevapann	Quepem	Barce
Devachirai	Sattari	Shirsode	Durgadevipann	Quepem	Gokulde
Devalachemol	Sattari	Dabe	Devatipann	Quepem	Bennudde

Rajendra Kerkar

(For more information on Sacred Groves see chapter 13)

Sacred groves are protected due to the influence of traditional religious beliefs



Paresh Porab

Book Review

FLORA OF GOA, DIU, DAMAN, DADRA AND NAGAR HAVELI (2 VOLUMES)

By Rolla Seshagiri Rao

Publisher: Botanical Survey of India
Pp.544

This is the first major work documenting the flora of the State of Goa. The data conforms to the International Code of Botanical Nomenclature.

It begins with a historical discussion of the numerous works dealing with the flora of Goa from Garcia da Orta and including Dalgado and others.

This part of the first volume is extremely useful for those who are looking for general information on the vegetation character of Goa.

The major part of volume 1 and 2 are devoted to a detailed inventory of different plant species. Rao deals with 1,115 species of Angiosperms and 27 species of Pteridophytes. The Angiosperms are spread over 146 families, with the family Fabaceae being the dominant one, containing 79 species covering 40 genera. In each case, Rao reports first the scientific name together with local and other nomenclatures, followed by a record of the distribution of the species and their localities.

Naturally, this part of the book is highly technical and basically of use to botanists. R.S.S. Rao also contributed basic information on plants when the Goa Gazetteer was being written up.

We found the book extremely useful when fighting the Tata Housing petition in the Supreme Court. While the Tatas disputed the fact that the trees on their plot were forestry species, we were able to show by a reference to Rao's book that practically all the species listed in the original Range Forest Officer's report relating to the plot were found in forests.

Protection to the Western Ghats

Conscious of the ecological significance of the Western Ghats, the Ministry of Industry, Government of India, sent this circular to the industries departments of all the States on 17.2.87:

Circular on protected districts:

'With a view to ensuring that ecologically fragile regions in the country are protected from adverse effects of industries which emit harmful effluents, the Department of Environment in the Ministry of Environment and Forests have identified a list of districts which they consider as totally protected and also those districts where non-polluting industries could be located. They have also identified a list of industries which could be set up in these districts in the various States/Union Territories.'

According to the circular, the East and South belt of Goa along the Western Ghats have been declared 'protected districts'.

BIRD LIFE

With the onset of the Southwest monsoons, the plaintive wailing call of the Stork-billed Kingfisher outside my window is heartwarming. I know they are back to breed. Another year for the birds and other wildlife! This is in Caranzalem, a suburb of Panjim, where over the past 13 years I've clocked up over 120 species.

Coming back to the stork-bills, kingfishers are known to dig their own burrows in soft embankments in undisturbed areas. But these birds breed in the trunk of a mango tree behind a bungalow! (I have avoided investigating the actual nest for fear of disturbing the birds.) This kind of behaviour has been recorded once before in Kerala a few decades ago and may be happening elsewhere. Birds don't read books so they aren't aware of what they are 'supposed' to do. Many species adapt to their surroundings.

With a wide range of habitats from the Arabian sea to the hills of the Western Ghats, Goa has a fair share of the number of bird species recorded from the subcontinent. The list so far stands at more than 350 with new additions nearly every year as the number of observers grows. Amateur observers contribute a significant input to ornithology by way of reporting unusual behaviour or appearance in a new area.

Let's take a quick trip around Goa and check out some of the popular birding spots.

The *Carambolim wetland* near Old Goa is a good spot to see wintering wetland species. Between late October and March, on most days one can see foreign birders with all their paraphernalia on the eastern fringe (opposite the railway line) and on the road south of the main wetland, which is a good vantage point for observations of the paddy and fallow fields.

The railway line and the constructions on the eastern fringe have eaten away parts of the wetland and scrub habitats but the overall diversity of the species I saw 12 years ago is roughly the same. But the sheer numbers of ducks and wetland associated birds have dropped considerably.

With telescope and binoculars it is a good place to introduce anyone to birds due to the good visibility. But how many telescopes and binoculars can be garnered for this? The idea of viewing 'galleries' won't work here as this is public land and vandalism and misuse is rampant. Viewing is best done on foot, but the bother of looking where my feet go peeves me no end. When flushed with adrenalin (a feeling familiar to most birders), the thought of cleaning up human shit from a tripod toe or boot sole is a pain I could do without.

The sighting, through a telescope, of a Heart-spotted Woodpecker has got many of my non-birding friends and associates hooked onto birds for life. I have seen this bird most often at *Bondla Wildlife Sanctuary*. This small protected forest coughs up some incredible birds. Bondla Sanctuary is a good place to catch a glimpse of the diminutive (smaller than sparrow) Oriental Dwarf Kingfisher. A few years ago while traipsing through the undergrowth to try and spot this Kingfisher, I came upon the sloughed-off skin of a medium sized King Cobra. After identifying the slough, I abandoned the idea of the Kingfisher and quickly got back onto the road.

I have never seen the Oriental Dwarf Kingfisher in Bondla, but some time after that trip—divine intervention or what?—a neighbour's cat brought one in, unharmed, into my house at Caranzalem! I shot a whole roll of film, and finally, to the relief of both parties, it flew off.

Molem National Park is my favourite place. Here one comes across 'mixed-flock hunting parties'—a phenomenon peculiar to the hills of southern India. I have tramped about for hours at a stretch without seeing anything worthwhile—the law about 'being in the right place at the right time'. Then one can be in the thick of things. Suddenly the birds come through like a virtual, vertical vacuum cleaner. So many species (from the ground up to the canopy) cooperatively flushing and feeding on insects. It's kind of breathtaking to try and identify as many as possible before the flock moves on and gets lost in the forest. Then silence again. The maximum number of species I have seen in a few minutes is 28. I may have overlooked a few in the excitement and the shrill cacophony and frenzied fluttering. An experience to cherish.

If there were better accommodation available in and around *Cotigao Wildlife Sanctuary*, I would be tempted to spend more time exploring the sanctuary and environs. This place has its own forest charm and birding excitement, but visits here should be combined with trips around Palolem where overnight stays are no problem.

A protected patch of our fragile mangrove ecosystem is the *Salim Ali Bird Sanctuary at Chorao*, which is easily accessible from Panjim. Lack of human disturbance makes this area an important 'staging' area for migrants. Their numbers here are noticeably higher in late September when they arrive and disperse further South, and in early March when they head north to breeding grounds. Low tide is the best time to see all kinds of Waders of all shapes and sizes; each species superbly adapted to its niche to exploit food sources.

Lesser known birding spots are spread out throughout the State. From suburban groves and 'barren' plateaus to marshy fields and dense forests, Goa has everything to offer the birding enthusiast.

The coastal stretch from Baga and the Chapora estuary to Morgim is particularly good for winter outings as large flocks of Gulls, Terns and Shorebirds can be seen at low tide. The open scrublands a bit inland are good for migratory Warblers and Pipits. The same applies to the Palolem beach area and Galgibaga and Talpona river estuaries. Velim's wetlands hold wintering waterfowl and lots of other birds. The surrounding open forest also yields interesting species.

Chandranath Hill, south and off the Margao-Quepem road, is a good place to see soaring birds of prey at any time of the year but it is better during winter when migrants increase their numbers.

Besides playing an active part in activities like pollination, pest control, scavenging, seed dispersion and also giving many of us the sheer enjoyment of watching them, birds also need safe nesting sites. If they cannot breed, they obviously vanish. And then we would lose more than just a beautiful sight. If it weren't for birds, insects would have destroyed all plant life long before man evolved.

Carl D'Silva

Birds of Goa

Barred Buttonquail
 Red Spurfowl
 Grey Junglefowl
 Indian Peafowl
 Lesser Whistling-Duck
 Ruddy Shelduck
 Comb Duck
 Cotton Pygmy-Goose
 Gadwall
 Eurasian Wigeon
 Mallard
 Spot-Billed Duck
 Common Teal
 Garganey
 Northern Pintail
 Northern Shoveler
 Ferruginous Pochard
 Tufted Duck
 Eurasian Wryneck
 Speckled Piculet
 Rufous Woodpecker
 White-Bellied Woodpecker
 Heart-Spotted Woodpecker
 Brown-Capped Pygmy Woodpecker
 Yellow-Crowned Woodpecker
 Lesser Yellownape
 Common Flameback
 Black-Rumped Flameback
 Greater Flameback
 Brown-Headed Barbet
 White-Cheeked Barbet
 Crimson-Fronted Barbet
 Coppersmith Barbet
 Malabar Grey Hornbill
 Malabar Pied Hornbill
 Great Hornbill
 Common Hoopoe
 Malabar Trogon
 European Roller
 Indian Roller
 Common Kingfisher
 Blue-Eared Kingfisher
 Oriental Dwarf Kingfisher
 Stork-Billed Kingfisher
 White-Throated Kingfisher
 Black-Capped Kingfisher
 Collared Kingfisher
 Pied Kingfisher
 Blue-Bearded Bee-eater
 Blue-Cheeked Bee-eater
 Blue-Tailed Bee-eater
 Chestnut-Headed Bee-eater
 Pied Cuckoo
 Large Hawk Cuckoo



Heart - spotted Woodpecker

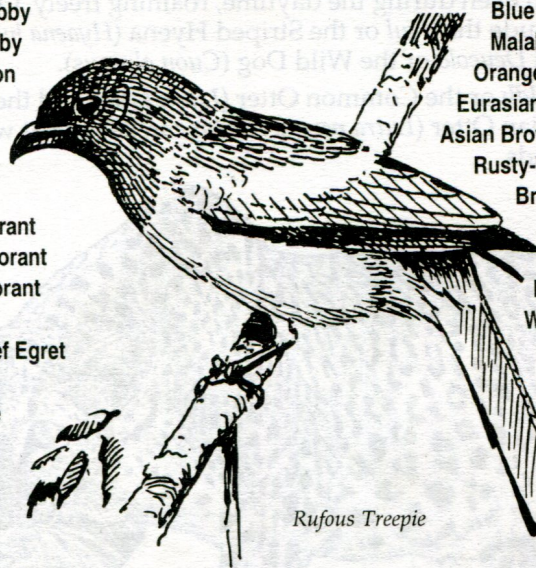
Common Hawk Cuckoo
 Indian Cuckoo
 Banded Bay Cuckoo
 Grey-Bellied Cuckoo
 Drongo Cuckoo
 Asian Koel
 Green-Billed Malkoha
 Greater Coucal
 Vernal Hanging Parrot
 Rose-Ringed Parakeet
 Plum-Headed Parakeet
 Malabar Parakeet
 Indian Swiftlet
 White-Rumped Needletail
 Brown-Backed Needletail
 Asian Palm Swift
 House Swift
 Fork-Tailed Swift
 Alpine Swift
 Crested Tree Swift
 Barn Owl
 Oriental Scops Owl
 Eurasian Eagle Owl
 Spot-Bellied Eagle Owl
 Brown Fish Owl
 Brown Wood Owl
 Jungle Owlet
 Spotted Owlet
 Brown Hawk Owl
 Short-Eared Owl
 Sri Lanka Frogmouth
 Grey Nightjar
 Indian Nightjar
 Savanna Nightjar
 Rock Pigeon
 Nilgiri Wood Pigeon
 Green Imperial Pigeon
 Mountain Imperial Pigeon
 Oriental Turtle Dove
 Laughing Dove
 Spotted Dove
 Red Collared Dove
 Emerald Dove
 Pompadour Green Pigeon
 Yellow-Footed Green Pigeon
 Sarus Crane
 Common Crane
 Slaty-Breasted Rail
 White-Breasted Waterhen
 Baillon's Crake
 Ruddy-Breasted Crake
 Watercock
 Purple Swampphen
 Common Moorhen
 Common Coot
 Pintail Snipe
 Common Snipe
 Black-Tailed Godwit
 Bar-Tailed Godwit
 Whimbrel

Eurasian Curlew
 Spotted Redshank
 Common Redshank
 Marsh Sandpiper
 Common Greenshank
 Green Sandpiper
 Wood Sandpiper
 Terek Sandpiper
 Common Sandpiper
 Ruddy Turnstone
 Great Knot
 Sanderling
 Little Stint
 Temminck's Stint
 Dunlin
 Curlew Sandpiper
 Broad-Billed Sandpiper
 Ruff
 Greater Painted-Snipe
 Eurasian Oystercatcher
 Black-Winged Stilt
 Crab-Plover
 Pheasant-Tailed Jacana
 Bronze-Winged Jacana
 Small Pratincole
 Pacific Golden Plover
 Grey Plover
 Common Ringed Plover
 Little Ringed Plover
 Kentish Plover
 Lesser Sand Plover
 Greater Sand Plover
 Yellow-Wattled Lapwing
 Red-Wattled Lapwing
 Pomarine Jaeger
 Yellow-Legged Gull
 Heuglin's Gull
 Pallas's Gull
 Brown-Headed Gull
 Black-Headed Gull
 Slender-Billed Gull



White - cheeked Barbet

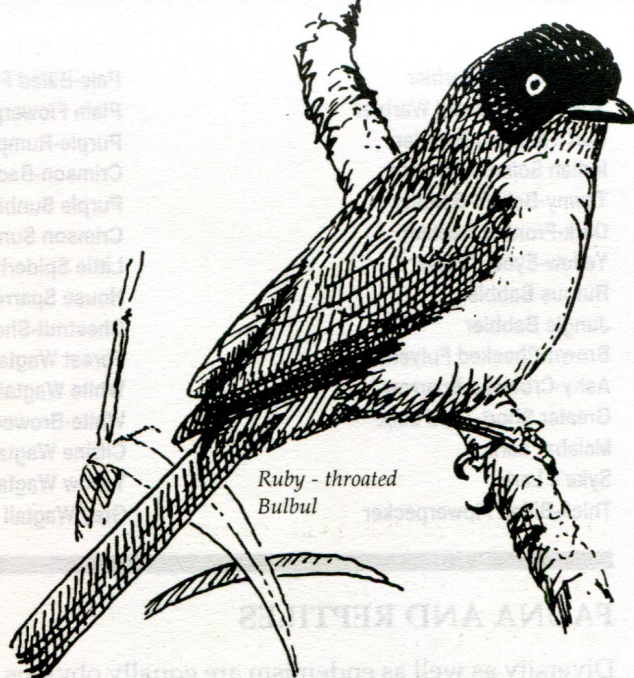
Gull-Billed Tern
 Caspian Tern
 River Tern
 Lesser Crested Tern
 Great Crested Tern
 Sandwich Tern
 Common Tern
 Little Tern
 Whiskered Tern
 White-Winged Tern
 Osprey
 Black-Shouldered Kite
 Black Kite
 Brahminy Kite
 White-Bellied Sea Eagle
 Egyptian Vulture
 White-Rumped Vulture
 Long-Billed Vulture
 Crested-Serpent Eagle
 Black Eagle
 Eurasian Marsh Harrier
 Pallid Harrier
 Crested Goshawk
 Shikra
 Besra
 Eurasian Sparrowhawk
 Oriental Honey-Buzzard
 White-Eyed Buzzard
 Common Buzzard
 Greater Spotted Eagle
 Tawny Eagle
 Steppe Eagle
 Booted Eagle
 Rufous-Bellied Eagle
 Changeable Hawk Eagle
 Common Kestrel
 Amur Falcon
 Eurasian Hobby
 Oriental Hobby
 Laggar Falcon
 Peregrine
 Falcon
 Little Grebe
 Darter
 Little Cormorant
 Indian Cormorant
 Great Cormorant
 Little Egret
 Western Reef Egret
 Great Egret
 Intermediate
 Egret
 Cattle
 Egret
 Indian Pond
 Heron
 Grey Heron
 Purple Heron
 Little Heron
 Black-Crowned Heron
 Cinnamon Bittern
 Glossy Ibis
 Black-Headed Ibis



Rufous Treepie

Eurasian Spoonbill
 Asian Openbill
 Woolly-Necked Stork
 Lesser Adjutant
 Indian Pitta
 Asian Fairy Bluebird
 Blue-Winged Leafbird
 Golden-Fronted Leafbird
 Brown Shrike
 Long-Tailed Shrike
 Rufous Treepie
 House Crow
 Large-Billed Crow
 Ashy Woodswallow
 Eurasian Golden Oriole
 Black-Naped Oriole
 Black-Hooded Oriole
 Large Cuckooshrike
 Black-Winged Cuckooshrike
 Black-Headed Cuckooshrike
 Ashy Minivet
 Small Minivet
 Scarlet Minivet
 Bar-Winged Flycatcher-Shrike
 White-Throated Fantail
 Black Drongo
 Ashy Drongo
 White-Bellied Drongo
 Bronzed Drongo
 Spangled Drongo
 Greater Racket-Tailed Drongo
 Black-Naped Monarch
 Asian Paradise-Flycatcher
 Common Iora
 Large Woodshrike
 Common Woodshrike
 Blue-Capped Rock Thrush

Blue Rock Thrush
 Malabar Whistling Thrush
 Orange-Headed Thrush
 Eurasian Blackbird
 Asian Brown Flycatcher
 Rusty-Tailed Flycatcher
 Brown-Breasted Flycatcher
 Red-Throated Flycatcher
 Verditer Flycatcher
 Nilgiri Flycatcher
 White-Bellied Blue Flycatcher
 Blue-Throated Flycatcher
 Tickell's Blue Flycatcher
 Grey-Headed Canary
 Flycatcher
 Bluethroat
 Indian Blue Robin
 Oriental Magpie
 Robin
 White-Rumped
 Shama
 Indian Robin
 Black
 Redstart
 Common
 Stonechat

Ruby - throated
Bulbul

Pied Bushchat
 Desert Wheatear
 Chestnut-Tailed Starling
 Brahminy Starling
 Rosy Starling
 Common Myna
 Jungle Myna
 Velvet-Fronted Nuthatch
 Great Tit
 Black-Lored Tit
 Eurasian Crag Martin
 Dusky Crag Martin
 Barn Swallow
 Wire-Tailed Swallow
 Red-Rumped Swallow
 Streak-Throated
 Swallow
 Northern House Martin
 Grey-Headed Bulbul
 Black-Crested Bulbul
 Red-Whiskered Bulbul
 Red-Vented Bulbul
 White-Browed Bulbul
 Yellow-Browed Bulbul
 Black Bulbul
 Grey-Breasted Prinia
 Plain Prinia
 Ashy Prinia
 Zitting Cisticola
 Oriental White-Eye
 Grasshopper Warbler
 Paddyfield Warbler
 Blyth's Reed Warbler
 Clamorous Reed Warbler
 Booted Warbler
 Lesser Whitethroat
 Common Tailorbird
 Common Chiffchaff
 Tickell's Leaf Warbler
 Sulphur-Bellied Warbler
 Hume's Warbler
 Greenish Warbler
 Large-Billed Leaf Warbler

Tytler's Leaf Warbler
Western Crowned Warbler
Puff-Throated Babbler
Indian Scimitar Babbler
Tawny-Bellied Babbler
Dark-Fronted Babbler
Yellow-Eyed Babbler
Rufous Babbler
Jungle Babbler
Brown-Cheeked Fulvetta
Ashy-Crowned Sparrow Lark
Greater Short-Toed Lark
Malabar Lark
Syke's Lark
Thick-Billed Flowerpecker

Pale-Billed Flowerpecker
Plain Flowerpecker
Purple-Rumped Sunbird
Crimson-Backed Sunbird
Purple Sunbird
Crimson Sunbird
Little Spiderhunter
House Sparrow
Chestnut-Shouldered Petronia
Forest Wagtail
White Wagtail
White-Browed Wagtail
Citrine Wagtail
Yellow Wagtail
Grey Wagtail

Richard's Pipit
Paddyfield Pipit
Tawny Pipit
Tree Pipit
Olive-Backed Pipit
Red-Throated Pipit
Baya Weaver
Indian Silverbill
White-Rumped Munia
Scaly-Breasted Munia
Common Rosefinch
Black-Headed Bunting
Red-Headed Bunting

List compiled & illustrated by Carl D'Silva

FAUNA AND REPTILES

Diversity as well as endemism are equally obvious among animals in the Western Ghats, as among plants. Blanford lists 48 genera of mammals, 275 genera of birds (with 28 endemic forms), 60 genera of reptiles with seven—*Hoplodactyles*, *Salea*, *Pseudoplecturus*, *Pleucturus*, *Melanophidium*, *Platylecturus* and *Xylophis*—being endemic forms in the Western Ghats from the river Tapti to Cape Camorin.



Bonnet macaque

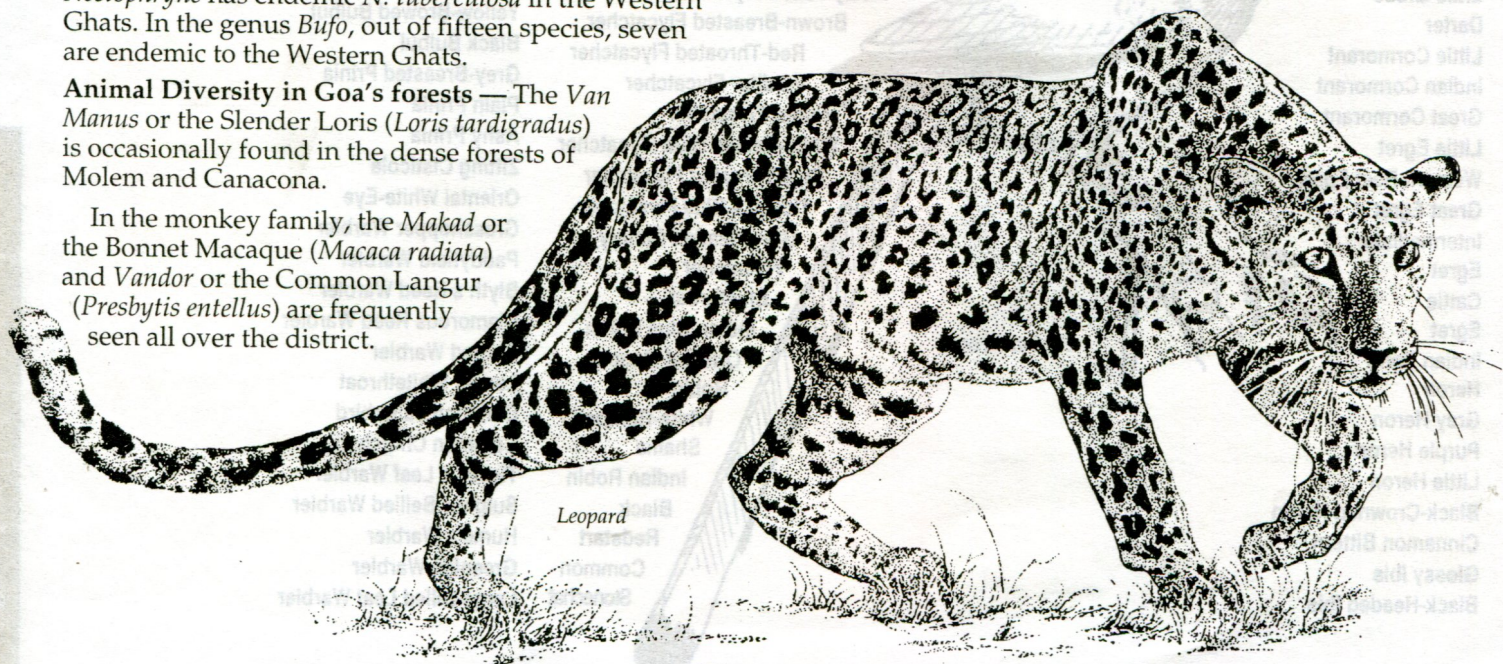
The order *Salientia* is the best represented amphibian group in India. The genus *Rana* within this order with 35 species reported from India, is mainly found in the peninsula, with 14 species endemic to the Western Ghats.

Family *Rhacophoridae*, with two genera and nine species from India, has four endemics in the Western Ghats. In the genus *Rhacophorus*, and in the other genus, *Philautus*, there are eight endemic species occurring in the Western Ghats, out of the ten species known from India. Family *Bufo* has three genera. The genus

Nectophryne has endemic *N. tuberculosa* in the Western Ghats. In the genus *Bufo*, out of fifteen species, seven are endemic to the Western Ghats.

Animal Diversity in Goa's forests — The *Van Manus* or the Slender Loris (*Loris tardigradus*) is occasionally found in the dense forests of Molem and Canacona.

In the monkey family, the *Makad* or the Bonnet Macaque (*Macaca radiata*) and *Vandor* or the Common Langur (*Presbytis entellus*) are frequently seen all over the district.



Leopard

Among the cat family, the *Vag* or Tiger (*Panthera tigris*) is rare. Stray animals may wander in from neighbouring forests.

Other species from the family include the *Bibito Vag* or Leopard (*Panthera pardus*), the *Toddy Cat* (*Paradoxurus hermaphroditus*), the *Ran Mazor* or *Baul Mazor*—Jungle Cat (*Felix chaus*), the *Vagati* or Leopard cat (*Felix bengalensis*) and the *Katanoor* or Small Indian Civet (*Viverricula indica*).

The *Mongus* or Common Mongoose (*Herpestes edwardsi*) is found near habitations.

Bhalu or the Sloth Bear (*Mellorsus ursinus*) is not uncommon in the district. It has on rare occasions attacked human beings in *Surla ghat* and in *Cotigao*.

The *Colo* or the Jackal (*Canis aureus*) can be sometimes seen even during the daytime, roaming freely. Others include the *Yeul* or the Striped Hyena (*Hyaena hyaena*) and *Deucolo* or the Wild Dog (*Cuon alpinus*).

Udh or the Common Otter (*Lutra lutra*) and the Smooth Indian Otter (*Lutra perspicillata*) can be seen at water ponds.

Sloth Bear



The Indian Bison

There is a paucity of research work on Goan animals in their natural habitat. One fortunate exception is the state animal of Goa, the Gaur (*Bos gaurus*), locally called *Govo Redo*. Rohi Naik, earlier Deputy Conservator of Forests in the Wildlife Division of the Goa Forest Department, prepared a monograph on the Gaur titled '*Gaur and its habitat: Studies in Goa*' (photocopy available with the Goa Foundation). This monograph contains a wealth of information on this magnificent beast, 'the tallest of living oxen, second heaviest next only to the Indian wild buffalo'.

The study covers the Gaur in its natural habitat at the Bhagwan Mahavir Wildlife Sanctuary. About the animal itself, 'A big bull may stand 64 to 72 inches high at the shoulders and weigh almost a tonne. Adult bulls have a shiny black, short haired pelage, except for white stockings, a grey boss between the horns and rusty coloured hairs on the insides of the thighs and forelegs. A small dewlap hangs below the chin and a large one drapes down between the forelegs. Cows are considerably smaller than bulls and...the dorsal ridges and dewlaps are not prominently developed. The pelage is dark brown and the horns are slenderer, more upright and with more inward curve than the bulls.

'Despite their heavy build, Gaur are active and nimble creatures; they are admirable climbers ascending the steepest slopes with speed and facility. They have a capacity for rapid flight to escape from predators. They are far-ranging animals moving in herds and are found mainly in the deciduous and semi-deciduous or semi-evergreen hill forests. Their main fodder is various kinds of tall and short grasses and a number of ground herbs and small shrubs. The foliage and soft twigs of tall shrubs, trees and climbers as well as bamboo foliage and tender culms are also eaten. They are bulk feeders and crop and ingest green fodder quickly, lying down several times in the day to chew the cud.



Gaur, Indian Bison, *Bos gaurus*

'They are exceptionally alert to potential danger. The sense of the smell of the Gaur is acute. (They make a) thumping sound which undoubtedly alerts others to danger and indicates the flight direction.'

Naik observes that the sanctuary is a good habitat for the Gaur, but suggests many measures for further improvement including stopping grazing by domestic cattle, canopy opening, bamboo planting and further studies on the requirements of the Gaur. He identifies many threats to the animals including encroachment, grazing, cane smuggling, roads, railways and irrigation projects

in or around the sanctuary, and spread of disease from decaying carcasses of cattle meant for the slaughterhouse and poaching.

The situation of the Gaur has improved a lot during the past twenty years or so, but complacency is a luxury we can ill afford. Without careful conservation measures, the Gaur could very easily go the way of the American bison, which is now extinct in the wild. Gaur were plentiful all over India at the end of the 19th century and it is up to us to ensure a revival in their numbers in the 21st.

The *Vagul* refers to the Fulvous Fruit Bat (*Rousettus leschenaulti*), or the Rufous Horse Shoe Bat (*Rhinophus rouxi*), or the Dormers Bat (*Pipistrellus dormeri*) and the Malay False Vampire (*Magaderma spasma*). Flying Foxes (*Pteropus giganteus*) and Short Nosed Fruit Bats (*Cynopterus sphinx*) are found at dusk. The *Pako* is the Indian Flying Fox (*Pteropus giganteus*).

The *Shenkaro* or the Indian Giant Squirrel (*Ratufa indica*) attracts the attention of any visitor to the forest by its peculiar call. Its nest can be found in the forests of Molem, Valpoi and Canacona.

The *Khadi Khar* is the three-striped palm squirrel (*Funambulus palmarum*), and the *Channi*, the five-striped palm squirrel (*Funambulus pennant*), both to be found on

figus trees. The *Pak Mazor* is the Large Brown Common Giant Flying Squirrel (*Petaurista petaurista*).

In the rodent family, the *Uindir* is the Indian Field Mouse (*Mus booduga*), the common house rat (*Rattus rattus*) and the Indian Gerbille (*Tatera indica*). The *Koli-undir* (*Bandicoot indica*) is found in plenty. Also included is the *Chueha* or Blanford's Rat (*Rattus blanfordi*) and the House Shrew (*Suncus murinus*).

The *Sal* is the common Indian Porcupine (*Hystrix indica*), renowned for damaging teak and cashew seedlings.

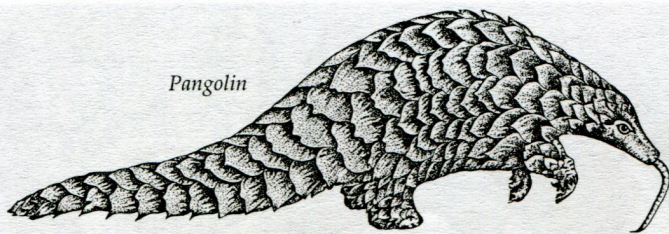
On grassy banks, the *Soso* or Hare (*Lepus nigricollis*) is found all over the forests.

The *Govo Redo* or the Gaur, the Indian Bison (*Bos gaurus*) moves in herds which are found in the Codal valley, Mollera, Salguinim, Zuna, Neturilm, and



False Vampire

Pangolin



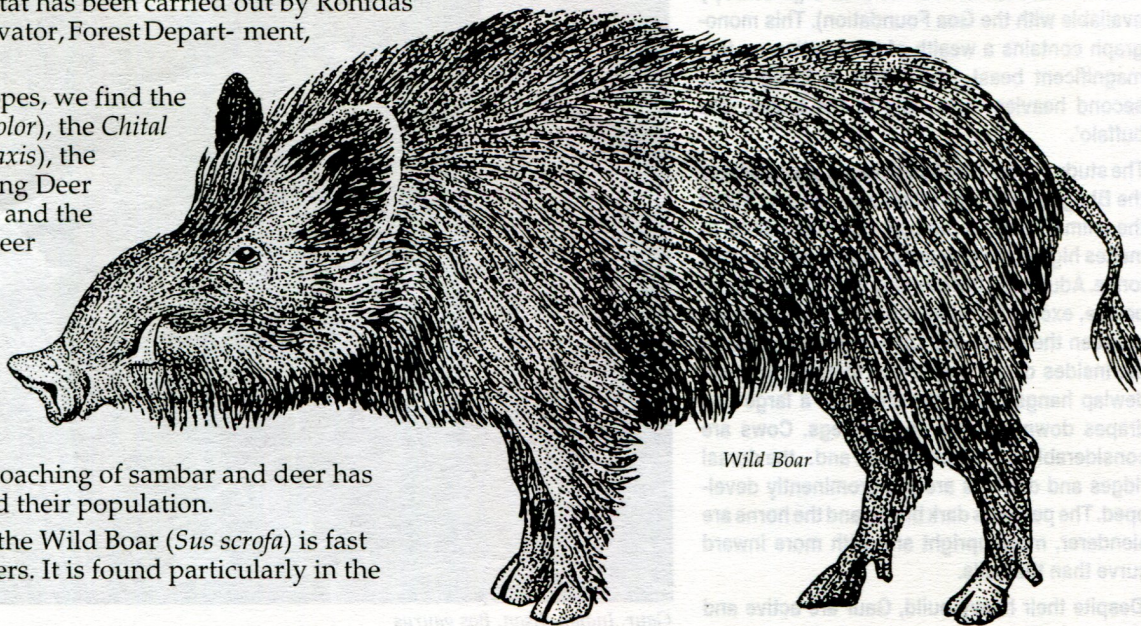
Canacona. It is also the state animal of Goa. A study of the animal in its habitat has been carried out by Rohidas Naik, Deputy Conservator, Forest Department, Goa.

Among the Antelopes, we find the Sambhar (*Cervus unicolor*), the Chital or the Cheetal (*Axix axis*), the Bhenkaro or the Barking Deer (*Muntiacus muntjack*) and the PISOI or the Mouse Deer (*Tragulus meminna*).

They are found throughout the forests of the district. One also finds the Kuring or Hog Deer (*Axix porcinus*).

Frequent poaching of sambar and deer has considerably lowered their population.

The Ran Dukar — the Wild Boar (*Sus scrofa*) is fast decimating in numbers. It is found particularly in the



Wild Boar

cashew fruiting season. Because it can damage paddy, banana and sugarcane crops, it is dreaded by farmers in the ghat areas.

Tiryo or the Pangolin (*Manis crassica udata*) is of rare occurrence and is occasionally seen on the trees. It survives by sucking ants.

Sea mammals include the Dugong or Sea Cow (*Dygong dugon*), the Porpoise (*Phocaena phocaena*) and the Long Beaked Dolphin (*Steno Spp*).

Animal Seizures

Some people seem to derive a kind of perverted pleasure from holding wild animals captive, the more exotic the better. They show them off to their friends and preen themselves on having confined a free-roaming animal to a tiny cage or enclosure. Almost invariably, such animals are miserably maintained and languish in misery before dying an untimely death.

These characters are now beginning to get their comeuppance. Along with the crackdown on trade in animals and animal parts, the Forest Department is now beginning to come down heavily on those who keep wild animals captive. This has been an offence under the Wildlife Act for some time; it is only now that the implementation is beginning to catch up.

Over the years, the FD has seized a wide variety of animals and released them into the wild. Bondla zoo acts as a kind of halfway house, where the traumatised animals can regain their health and vitality before they are released. Some animals, which have suffered grievous injury, can never be returned to the wild, but they can at least remain in Bondla, in better surroundings and with better care than that given by their erstwhile owners.

Recognising that part of the problem at least is genuine ignorance of the law, the FD launched an amnesty scheme. Through advertisements published in the newspapers in July 1999, the FD

asked owners of captive wild animals to declare them to the authorities. In return, the owners would be protected from prosecution. The FD would take an appropriate decision regarding these animals after inspecting them.

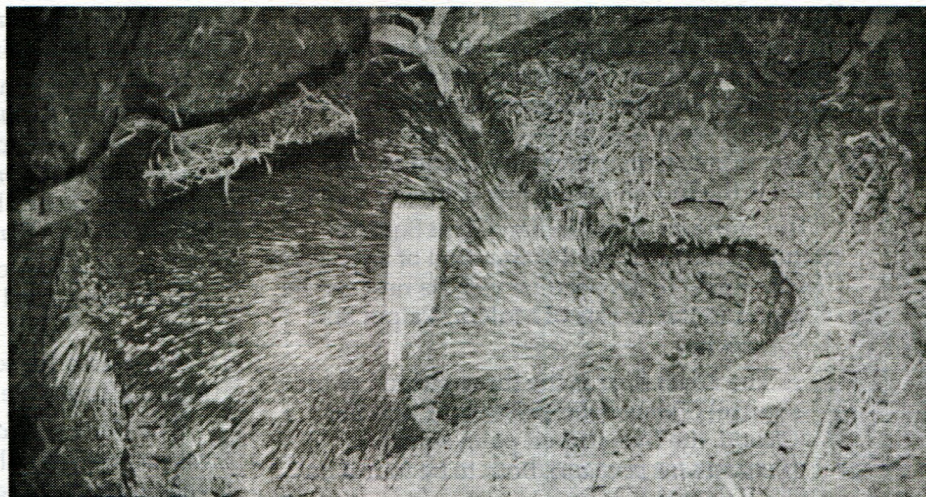
The result was a varied bag of exotic creatures, declared by a total of 49 persons. The creatures ranged from crocodiles to tortoises to monkeys to exotic birds, even porcupines and deer.

It is not that all the cases were obnoxious. Some owners had owned the animals for years and

maintained them well. Some were from other parts of the world like Africa and are unlikely to survive in the wild here. Others have become thoroughly domesticated and will face problems if released. Many such owners requested the FD to be allowed to keep such animals. Each case was being considered on its merits and an appropriate decision taken. Some animals like the crocodiles were immediately taken charge of and released into the wild soon after.

If you have a captive wild animal or bird, remember that it is not only a crime, but also a shameful act. You could contact the FD or your nearest animal rights group about what is to be done.

Poached (shot) porcupine at Vagheri



The Illegal Wildlife Trade

With the promulgation of the Wild Life Act, 1972, it became a legal offence to kill wildlife and trade in wildlife parts. This long overdue measure was necessary in order to prevent the loss of further wildlife to poachers and traders.

The international wildlife trade has a turnover that, among illegal enterprises, is exceeded only by the narcotics trade. Live animals as well as dead creatures or their body parts are sourced by countries like the US and Japan from all corners of the Third World. International laws have come into force to curb activities like the ivory trade. Celebrities have joined international campaigns against furs and other animal body parts and there is a growing awareness of the need to control this trade. Unfortunately, we still have a long way to go.

The popular image of Goa is not one of a place with abundant wildlife. But, as we have seen, there is plenty of wildlife in Goan forests. Could poachers and traders be far behind?

Poaching is increasing day by day in Goa. It takes place throughout the Goan forests at night. Poachers roam the forests armed with sophisticated weapons and powerful searchlights. Most of the poachers are well-off people from the urban areas who take the help of the locals to locate and kill animals. The locals are paid for their services in cash, or sometimes in kind, by receiving part of the meat of the animal killed. The weapons used range from 12 bore double-barrel guns to muzzle loaders which are usually illegal, i.e. unlicensed.

Based on an informal survey conducted over the past three years in Goa's forest areas, it is estimated that every year approximately 3 Indian Bison (Gaur), 26 sambars, 20 spotted deer, 34 barking deer, 68 mouse deer, 118 wild boar, 170 black naped hares, 30 giant squirrels, 130 porcupines and 2 leopards are killed in the forests by poachers. Apart from these, other animals killed include civet cats, pangolins and crocodiles. Birds like peafowl, jungle fowl, herons, egrets, etc. are also killed in significant numbers.

It is a misconception to hold that animals are killed by local villagers for meat. This may happen to some extent, but it is not the main threat to wildlife. The threat comes from city-based hunters who hunt animals for sport. They seem to feel that their manhood is somehow enhanced if they can show that they are able to kill defenceless and harmless creatures. Behind these sportsmen come the traders who traffic in animal parts.

Wild animals are killed for meat or for their body parts like fur, skin, claws, bones, teeth, etc. In various villages, organised hunting or *bhovni* is still in practice. It is conducted annually and animals are killed in the name of appeasing some deity. The meat of wild animals is considered a delicacy by many.

Many of the body parts fetch high prices. So do leopard skins. Poachers kill this beautiful animal for its skin, bones, claws and teeth. The skin can



Nirmal Kulkarni

Leopard cub killed at Chandor at close range, hence the widespread damage to the skull

be sold in neighbouring states like Karnataka to businessmen and traders for between Rs 5,000-10,000. There is considerable demand for tiger bones which are used in Chinese medicine and leopard bones are often disposed of as tiger bones. Due to poaching, the prey base of the predators has declined considerably. This is likely to lead to animal-human conflict. Leopards have already started raiding farms in search of easy prey like poultry and cattle.

The monitor lizard, locally known as *gar*, is killed in large numbers for its skin which is used in making a traditional drum called *ghumat*. In a market in Goa, as many as 700 skins were sold during a single season. The price of a skin ranges between Rs 100-300 depending on the condition. Another major cause for the decimation of monitor lizard populations has been the belief that the blood of the lizard when drunk soon after the lizard is killed gives relief in cases of asthma. For this reason, monitor lizards are part of the stock-in-trade of every roadside quack. And they are not the only animals facing threats from this source.

A number of restaurants in Goa even serve wild animal meat on request, particularly to foreign tourists. The meat served is that of wild boar or sambar. They are able to get a regular supply from poachers who sell the meat for around Rs 300 a kg.

A large number of Indian bullfrogs are killed at the onset of the monsoon for food and sold to restaurants. Frogs play an important role in keeping down the mosquito population. And then we wonder why malaria is on the rise in Goa.

The trade in shark fins also exists in Goa. Fins are collected by a local dealer for export to South-East Asian countries where this delicacy is in great demand and fetches a high price. Harpooning is common around islands of the Goan coast. The porpoises are killed using harpoons by people who conduct dolphin cruises and trips to the islands. Dolphin meat is regularly available in the markets.

Poaching can be curbed if the Forest Department and the Police Department work in collaboration and put an end to the existing trade in illegal

weapons in the state. There must be speedy disposal of cases with stringent punishments to offenders. Guards should be honoured and rewarded for their courageous services. Adequate arms and equipment should be provided to curb poaching. That firm and stringent measures are required is evidenced by the rioting that occurred in South Goa when some poachers were caught selling meat of wild animals as well as dolphins.

The Deputy Conservator of Forests (Wildlife), C.A. Reddy, feels that the Supreme Court Order about issuing arms to Forest Department officials has not really helped as the infrastructure is not in place. Without a proper armoury and procedures in place for issuing weapons, the scheme remains on paper.

Thus, when the guards are without weapons, they find it difficult to confront poachers who are armed to the teeth. Further, considerable demoralisation sets in when most poachers who are booked end up getting off scot-free as few are convicted by the courts. Also, if role models of youth like the Hindi film actors Sanjay Dutt and Salman Khan go around shooting animals in the forests, one can imagine the impact that such an image has on the minds of youth. Education of the public is the need of the hour. The Forest Department recently faced problems from enraged traders in South Goa when animal meat was seized in a raid. Such regrettable incidents can be curbed only by creating greater awareness among the public regarding wildlife protection laws and the need to protect wildlife.

The Forest Department and its anti-poaching squad are doing a commendable job in curbing the hunting of wildlife. Certain lacunae remain, though. For example, the sale of peacock feathers just below the Forest Department office in Panjim was stopped only after the intervention of the Union Minister of State for Social Welfare and animal rights activist, Maneka Gandhi.

Paresh Porob

'Bhovni' is nothing but the tradition of *akhand shikaras* as it is known in the rest of India. The word *bhovni* literally means a stroll or a walk. In the context of the tradition prevailing in villages which come under the talukas of Sattari, Sanguem, Quepem, Bicholim and Canacona, it now symbolises a ritual of systematic hunting of wild animals.

'*Gauv Bhovni*' or the village hunt is usually undertaken to celebrate the harvest season, locally known as *hangam*—approximately five days after the harvesting is complete—an occasion when the farmers' hard work and toil have given good results, in the form of grain that has reached their homes. It is obviously a time for rejoicing and for expressing gratitude towards the village deities.

A group of people, normally the *gaunkars* of the village, gather within the village temple premises and discuss the plans and the area for the *bhovni*, in consultation with the village elders and experienced hunters of the village. After this, the *gadi* or the local god's representative is consulted as to on which aspect of the god or goddess the offering should be made, and for simultaneously fixing the day, time and area where the *gauv bhovni* will take place. Usually a certain animal is attributed to a certain god or goddess. This differs from village to village and taluka to taluka. Given below is a rough idea of how the animals offered are attributed to certain deities, in Sattari taluka:

Female Sambar - Goddess Brahmani, Goddess Kelmai

Male Sambar with antlers - Goddess Sateri, Goddess Akhuri

Male Sambar - Vyaspathi (Secretary) of Gods

Female Wild Boar - Goddess Gajalaxmi

Male Wild Boar - Goddess Mahishasurmardini

Male Barking Deer (with antlers) - Goddess Brahmani

Porcupine - Purush Dev.

After the schedule for the hunt has been fixed and agreed upon, a villager roams the village with a small drum announcing loudly: '*Falya gav bhovni asa. Gharatil ek manus devlat jama javo.*'

Accordingly, the following day, villagers gather in the temple compound early in the morning, armed with sticks, guns, spears, torches and headlights, and other instruments like the *koyto*, *pal* and *kurhad* and with musical instruments like the *dhol*, *tashi*, cymbals, tins, etc. which the villagers get from their own homes. The *Gaunkars* from the village then initiate a small thanksgiving and invocation prayer called the *garhane*, to thank the village deities for the good yield of the crops, and also to invoke their blessings for the *ganv bhovni*. Next, the *Gaunkars* along with the experienced hunters, enter the temple premises to set up the groups and identify the spots they will occupy in waiting for the animals, etc. These hunters are extremely knowledgeable about

The Bhovni Hunting Tradition

jungle paths and patches that the animals use, and it is these places which are meticulously identified and selected for the exercise.

On reaching the forest area demarcated, in the form of procession and to the sound of musical instruments the groups disperse, with hunters having guns taking up their assigned spots accompanied by 2-3 villagers with headlights and torches. Likewise major paths are covered by gunmen. The rest of the villagers commence creating loud noises, flushing out the prey from the bushes from the opposite direction. The animals, confused and frightened with the noise and lights, get shot and killed as they try to escape.

While in some villages the 'Bhovni' parties ignore smaller wildlife like hares, porcupines and civet cats, others shoot and kill whatever is seen, in the name of village deities. Once an animal is killed, it is garlanded and laid on a ladder made of sticks, and brought to the village temple in a procession with great joy, pride and energy on the shoulders of the villagers to the village temple.

Outside the temple premises, the temple *pujari* or *devaskar* cuts the right ear of the animal and offers it to the particular deity as an offering.

posts, after which the rest of the meat is distributed equally amongst the villagers. Every house in the village gets its share. The horns or antlers and the skin are either sold and the money deposited in the temple fund or the horns are sometimes exhibited in the temple premises itself.

The whole ritual lasts three days. If the desired animals are not hunted in this span of time, it is considered a sign of displeasure of the village deities. The villagers seek forgiveness and set out for another *bhovni*.

There are varieties of *bhovni*. During 'Parmeshwarachi Bhovni' or 'Sadhi Bhovni', which is taken out in the dark of night, a select group of people sit at particular spot—preferably near a water hole—and shoot whatever animals come to drink water. Even though this type of *bhovni* is undertaken for commercial reasons or for entertainment, the permission of the village *Gaunkars* and the village deities is always taken prior to the exercise. The meat of the animal killed during a *Sadhi* or *Parmeshwarachi Bhovni*, is distributed amongst the villagers who participated in the *bhovni*. Some share is given to the Sarpanch, the *Gaunkars* and other small digni-



Horns of the hunted Sambar are exhibited in the temple premises at Caranzol

Once the prayers and the offering are complete, the prey is cut and the meat systematically distributed amongst the villagers. While the part of the meat above the shoulders is given as a mark of appreciation to the villagers who carried the prey on their shoulders, the villager whose bullet hit the animal first is given a forelimb as a token of respect for his marksmanship. Likewise, one of the limbs is given to the village priest or *Devaskar* who cooks it with the portion of the offered ear and distributes it as *prasad* to the villagers present at the temple. Then the *gaunkars*, the sarpanch, the Fauzdar, the police constable, are given shares of the meat to honour their

taries of the village, for allowing the *bhovni* to be conducted.

In recent years, the concept of Bhovni has been altered considerably and it is now sometimes carried out even during local festivals, often 2-3 times in a year. At the same time, it has also to be admitted that the practice or tradition has also been discontinued in some villages due to the intervention of the Forest Department and the enforcement of wildlife laws.

Nirmal Kulkarni and Sarvesh Gauns

The Common Indian Monitor Lizard

The Common Indian Monitor Lizard, found all over Goa, belongs to the family *Varanidae* and can be easily identified by its long flattened body and equally long tail, and a flickering long tongue, quite similar to a snake's.

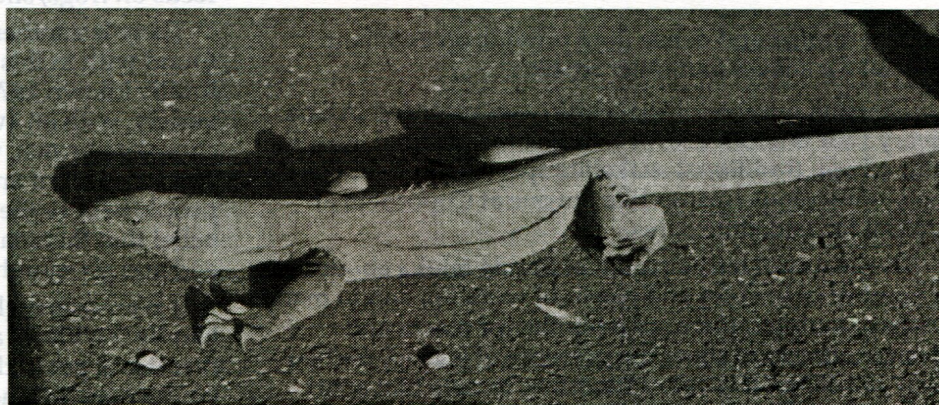
Locally known by Goans as *Gar* or *Ghorpad*, the Common Indian Monitor Lizard grows to an average length of 1.2 meters from head to tail. An adult's colouration will vary from olive-greenish to brownish-grey and some unevenly distributed black spots on the upper side, while on the lower side the colouration usually is yellowish-white to dirty yellow, again patched with faint black spots. Young ones, however, sport bright colours, including a dark olive or dark brown shade, with interlacing white spots and dark brown spots on the upper side of the body.

Normally found in rock crevices alongside cliffs and rock formations, in burrows or natural cracks in the ground, monitor lizards are also good at adapting to deserted tree trunks, termite mounds, walls of broken down and neglected mud houses, the undersides of roof tiles, and above all in damp storehouses or godowns in villages or settlements close to forested areas.

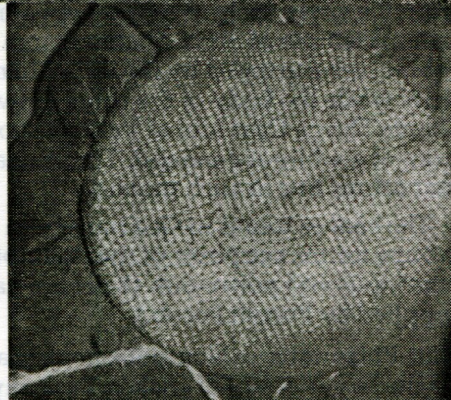
The Common Monitor Lizard is a carnivorous reptile and its food includes rodents, birds' eggs, skinks, snakes, spiders, insects and virtually anything that it can overcome with its powerful claws. Being good climbers and capable of attaining good speed when required, Common Monitor Lizards are diurnal creatures and usually stalk the forest floor for prey in the early mornings or evenings.

When cornered, or if it encounters danger, the Common Monitor Lizard will instinctively raise its forelegs, coupled with constant hissing and rapid movement of its tail, thus putting up a formidable display and making anyone think twice before disturbing this reptile. And it is not an empty threat—monitor lizards can inflict serious bites if handled carelessly, apart from the tough grip that they are capable of imposing with their strong claws.

But despite being such a fascinating reptile, it is being ruthlessly exploited in the state, especially to make traditional drums called '*Ghumats*', earthen pots with openings over which the skin of a monitor lizards is stretched to create a very traditional indigenous drum, essential as an instrument for any Hindu religious activity, especially in Hindu temples and even homes, or at socio-religious gatherings. The trade in monitor lizard skin reaches its peak a month before Ganesh Chaturthi festival, when *Ghumats* are in great demand for performing the religious *Ghumat Artis*. Professional *Ghumat* makers or poachers set off with their well trained dogs, who sniff out the poor lizards from their burrows, to be caught by the neck and strangled, then tied to a stick and ceremoniously carried, just like a trophy. On an average, a single poacher along with his faithful



Monitor lizard (top), with drums (*ghumat*) made from its skin (below). Close-up (middle) shows how the lizard's skin is stretched across the mouth of the mud-pot to create the drum. Though illegal, the drums continue to be manufactured and sold unofficially



Nirmal Kulkarni

dogs is believed to be able to capture at least 3-4 monitor lizards in a relatively undisturbed patch of forest. A *Ghumat*-maker is believed to sell a minimum of 75-100 *Ghumats* in a month in areas like Bardez and Marcel, etc., where *Ghumat Artis* are a must on any religious occasion. Besides this there is a slow but steadily increasing demand from outside Goa for use in the fashion accessories trade as handbags and wallets.

Add to that the use of different parts of the monitor lizards as traditional medicines in various parts of Goa. While urban Goans consider the blood of this reptile a cure for asthma, oil is extracted from the lungs after heating and compressing and is believed to cure complicated burns, wounds and cuts. Villages of Netorli are known to extract its oil to improve weak eyesight

and as an effective massage oil for making children's bones stronger.

Thus, exploited for its skin and body parts, and its habitats under constant threat, entire populations have been wiped out from certain areas where they were once in abundance. This should cause concern, not only amongst wildlife-lovers but also the people at large, as monitor lizards are important rodent controllers and thus of great economic importance.

But being protected under the Wildlife Protection Act, by fines and even imprisonment for killing or capture has not helped in the protection of this reptile. It is only people's will and subsequent action that can save this fascinating reptile from disappearing from the Goan environment.

Nirmal U. Kulkarni

SNAKES

Heavy rainfall and dense flora provide an excellent habitat for snakes and other reptiles.

The total number of snakebite cases recorded in Goa every year is about 200, of which some are fatal. People still rely on traditional snakebite specialists or supposedly miraculous springs like the one at Copordem at Valpoi for snakebite cures.

The beautiful fertile region of Ponda taluka abounds in a number of temples and places of worship, and in many of these temples, there are a number of marks and designs that go to show the presence of snakes, particularly the cobra. It is very interesting to note that apart from the silver idols of cobras kept at many temples, the famous temple of Shree Shanta Durga at Queula has two cobras being gripped by the upper hand of the famous deity while the body of the cobra entwines the arms. The Shanta Durga Devi idol at Velinga shows the Goddess in front of a white-ant mound. Traditionally it is believed that cobras live in such mounds.

The snakes found in Goa have been classified into two groups for the purposes of the description, viz. non-poisonous and poisonous. (Konkani names have been supplied by Paresh Porob.)

Non-Poisonous — Non-poisonous snakes constitute by far the larger group of snakes; basically, most snakes you meet are likely to be completely harmless.

Typhlina bramina (The Common Blind Snake or Worm Snake): This snake is locally called *telyo*. It looks superficially like an earthworm but is slightly bigger than an ordinary earthworm and has widely overlapping scales with an iridescent sheen. It has no circular divisions as one sees in the case of earthworms. In the forests leading to Valpoi one often comes across this snake near rotting tree trunks. It has a small spine at the tail-end and the mouth is constantly moving. It has no teeth on the upper jaw and is absolutely harmless. It feeds in normal circumstances on rotting material around the trees. This snake is highly specialised for underground survival. *Typhlops acutus* is also found in Goa.

Uropeltis ocellatus (The Ocellate Shield-Tail): This rough tailed snake is sometimes met with in the hill regions adjoining the Karnataka border of the territory. It grows to about 50 cm and has a very beautiful coloration, slightly yellowish brown on the top surface and uniformly yellow on the lower surface. It produces about four to five young ones at a time.

Eryx conicus (the Russell Sand Boa or the Common Sand Boa): This is a very common snake found even at a height of 3000 ft. It grows to a maximum length of 1 metre, with the average being about 50 cm. It is chocolate-brown on the top surface with blotches of grey pattern spread all over the body. The snake is stumpy with

a rough tail and square nose. It has small eyes on the head region and it prefers to remain buried in the soil. It feeds on frogs, small mammals, lizards and birds.

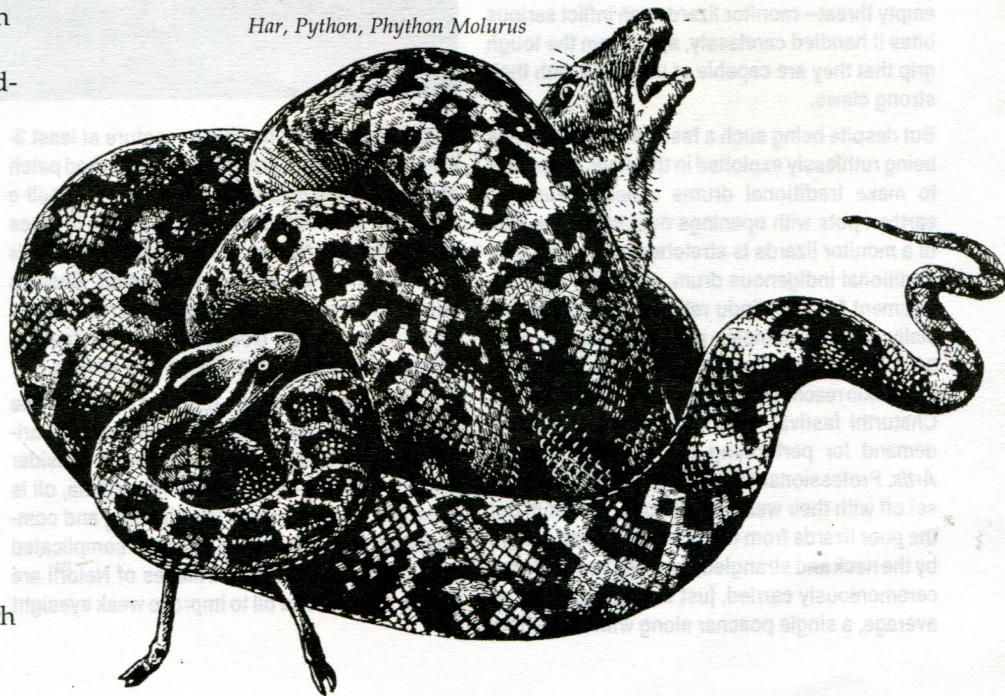
There is another variety of Sand Boa very commonly found with in this territory: the *Eryx johani* (Red Sand Boa), locally known as *Malun*. This snake is bigger than the first variety, with an average length of 75 cm. It is uniformly chocolate-brown, with no spots anywhere on the body. The tail is blunt and looks like the head; that is why many people believe the snake has two heads. There is also a belief that this snake moves for six months from the tail end and six months from the head end. This is not true.

It is an extremely lethargic snake and anyone can handle it without any fear of it biting. Some people even rear it as a pet in their houses. It gives birth to six to eight young ones around June and feeds on mice, lizards, small frogs and small birds.

Python molurus (Indian Rock Python): This snake is locally called *Har* or *Azgar*. It is available in the rocky regions of the hill ranges where there is plenty of water in the streams. It can grow up to 6 m in length. It has a blotched chocolate-brown pattern on top and is lighter on the underside with bluish grey patterns all over the body. It is heavy-bodied and smooth-scaled. It has a lance-shaped tail and a short head. It does not crush its prey but restricts its respiration and heart beat. It feeds on prey ranging in size from mice to jackals and civets. It has even been seen to attack goats, wild boar and deer. Normally, it feeds on small mammals and birds. It is a peculiarity of this snake that at the base of the tail and near the anus there are two one and half inch (40 mm) long pointed stubs sticking out from the sides of the anus; these are vestigial legs. The python lays big eggs and many people eat these eggs.

During the last few years, a large number of pythons, disturbed from their habitats, have emerged in the coastal belt. Due to development activity including the erection of foundations for buildings, python habitats everywhere have come under attack. Pythons have emerged in village compounds, garages, schools, churches and chicken coops, where they have decimated poultry, inviting

Har, Python, Python Molurus



retribution from villagers. The Forest Department has usually taken away the reptiles and relocated them in forest areas. Fortunately, no pythons are killed as most people consider them as harmless.

Elaphe helena (The Trinket Snake): This is a snake growing to a maximum of 1.5 m in length with the average being about 70 cm. It is light or dark brown with black cross bars containing white spots which are very conspicuous towards the head region. It is an extremely active snake which can make quick strikes when handled. Its food consists of small mammals, lizards, and frogs, though it is mainly a rat eater. When excited, the snake will assume an attitude of defiance but may not strike immediately. It lays 6-8 long eggs.

Ptyas mucosus (Dhaman, Indian Rat Snake): Locally known as *dhivad*. This is a very common snake, especially in the plains and many a time it will be seen in the house and also in the farm areas. It can grow to about 3.5 m with an average of 2 m and is camel-yellow in colour with black border on the scales, especially in the tail or the head region. There is another variety of this snake which is slightly brown in colour. This too is found in different regions of the territory. It is an extremely agile snake. It even jumps up trees. It feeds on rats, birds and frogs. It is a very good predator of rats. Apart from this, it leaves a very foul smell on the body, which many people think leads to the body decomposing. This is not true. The foul smell can be washed away with soap and water. The snake lays about 8-16 eggs buried in the soil.

Oligodon taeniolatus (Russell's Kukri Snake): This snake is very common in the farmlands and may be found in gardens. It grows to about 75 cm in length and it has brown spots on the body which look like cross lines. There are also green lines at the sides. The cross lines are very prominent and that is why this snake is often mistaken for a krait. It is a very harmless snake and is found all over the territory. The distinction between this snake and the krait lies in the fact that in the latter the central row of dorsal scales is hexagonal, while in this snake all the scales are more or less equal. It feeds on very small mammals, lizards and tiny reptiles. It lays eggs in the soil, which hatch during the rainy season. The Banded Kukri Snake (*Oligodon arnesis*) is also found in Goa.

Chrysopelea ornata (Golden Tree Snake or Flying Snake): It is a beautiful coloured snake. It grows to about 1 m in length. The colour is variable, even running to black with narrow pale greenish cross bands. The underside is greenish and has lateral folds on the belly scales. It hangs from the trees and may even be seen jumping from branch to branch, feeding on lizards, geckos, small mammals, birds, insects and even small snakes. It catches the victim by the mouth and swallows prey alive. It has been seen to jump a distance of 20 feet. It lays elongated eggs, upto twelve at a time. It is a very common snake in the hilly forest regions.

Lycodon aulicus (The Common Wolf Snake): This snake is locally called *pasko*. It has an average length of 30 cm, though it can grow up to 80 cm. It is grey with thin white or yellow cross bars ranging in number from 12 to 19 and expanding laterally, enclosing triangular patches. This snake is often mistaken for a krait, but it has not got the hexagonal dorsal scales of the krait. The upper lip is

white spotted with brown. It is a very common snake and can even be seen near human habitation, in houses and gardens, hiding between stones and bricks. It is absolutely harmless.

Natrix piscator

(The Checkered Keelback): This is the common water snake found in muddy places.

It is locally called *yevale*. It averages about 60 cm in length.

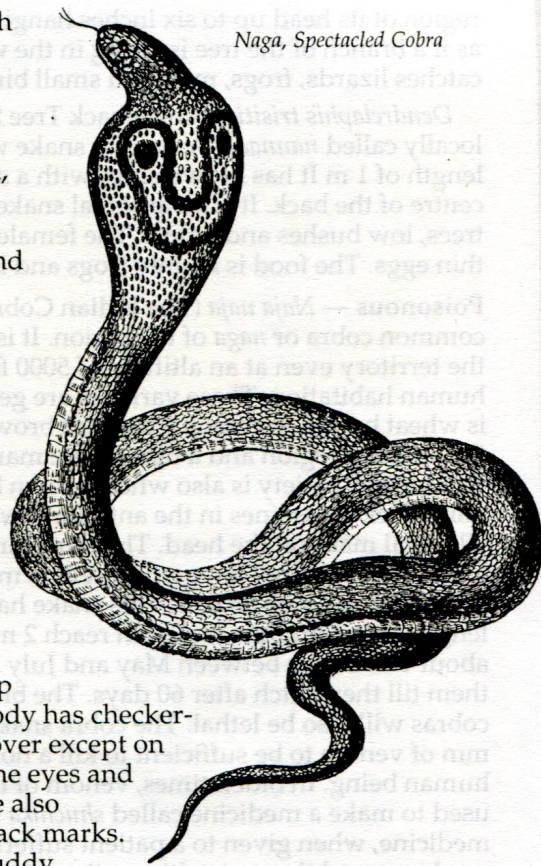
The colour is deep brown and the body has checker-board marks all over except on the lower side. The eyes and the upper lips are also bordered with black marks.

It inhabits the muddy waters, feeding primarily on frogs and fish, but not averse to small mammals. The female lays 20-40 eggs and incubates and protects them until they hatch. It is a prolific feeder and can devour enormous amounts of frogs and fish. It generally swallows its prey alive and is sometimes mistaken for a cobra.

Amphiesma stolata (Striped Keelback): This snake is also locally called *yevale* and one can see this snake during the rainy season on the roadside. It grows to a maximum of about 80 cm in length and 10 mm in breadth, with the average length being 40 cm. The colour is deep brown with two tan stripes running down the body length. It feeds mainly on frogs but also eats insects, small lizards and rodents. It swallows its prey live. It is an extremely docile snake and many people keep it as a pet. It lays 10-15 tiny eggs before the rains.

Boiga trigonata (Indian Gamma): This snake is also called the Cat Snake. The female can grow to 1.25 m with the average being around 65 cm. The body is wheat brown with a darker zig-zag pattern. In the neck region are deep brown thick lines, which start from the base of the head and go two inches further forming a clear Y-mark. It lays eggs before the monsoons. It mainly eats lizards, but also eats mice and small birds.

Ahaetulla nasutus (Common Green Whip Snake or Vine Snake): This snake is locally called *Haryali*. It is a beautiful parrot-green snake which looks like a whip with an average length of 1 m. The end surface is faint green in colour. At the sides are found yellow spots. The head is elongated and there is a long snout in front of the mouth, at the sides of which are situated the nostrils. The eyes are big and round with faint greyish green pupils. It blends so well with the grass and tree branches that it is many times very difficult to spot it. It keeps the front



Naga, Spectacled Cobra

region of its head up to six inches hanging and shaking, as if a branch of the tree is flying in the wind. It mainly catches lizards, frogs, mice and small birds.

Dendrelaphis trisitis (Bronzeback Tree Snake): This is locally called *nannado*. A slender snake with an average length of 1 m. It has brown sides with a stripe down the centre of the back. It is an arboreal snake occupying thorn trees, low bushes and palms. The female lays about 6 long thin eggs. The food is mainly frogs and lizards.

Poisonous — *Naja naja* (The Indian Cobra): This is the common cobra or *naga* of the region. It is found all over the territory even at an altitude of 5000 feet, and also near human habitation. Three varieties are generally seen. One is wheat brown in colour with faint brown markings in the anterior region and a binocellate mark on the head. The second variety is also wheat brown but has fewer faint black cross lines in the anterior lower region and an elliptical mark on the head. The third kind is deep wheat brown but does not have a binocellate mark on the head. All these are cobra snakes. This snake has an average length of 1 m and the male can reach 2 m. The female lays about 12-30 eggs between May and July and stays with them till they hatch after 60 days. The bite of the baby cobras will also be lethal. The cobra snake has to inject 12 mm of venom to be sufficient to kill a normal sized human being. In olden times, venom of these snakes was used to make a medicine called *shuchika bharanaras*. This medicine, when given to a patient suffering from cholera, used to retard the peristaltic motion of the digestive tract and this saved the patient from dehydration and sure death. The poison of this snake is neurotoxic. There is not much pain at the site of the bite but when injected in sufficient dose, the reaction starts within six to eight minutes. If no remedy is available, the patient feels a benumbing sensation at the tips of the appendages which gradually travels up the body till the breathing muscles are paralysed and the patient gasps for breath and dies of respiratory paralysis. The only sure remedy against this bite is an anti-venom.

Ophiophagus Hannah (King Cobra): This is locally known as *Raj Nag*. The adult may reach a length of 5 m, though the average is about 3 m. It is sometimes met with in the region bordering the Londa forest of Karnataka State near Cotigao wildlife sanctuary. However, it is a very rare snake. It is black with thin yellowish and white stripes all over the body including the head. There are no marks on the hood, which is less broad than that of the ordinary cobra. However, this snake raises the hood up to a height of three feet. It feeds only on other snakes. It is found in forests abounding with bamboo leaves.

The venom of this snake is neurotoxic but the amount of venom given is much more than the ordinary cobra and that is why the victims succumb much earlier to the bite of this snake than that of the other cobra. The anti-venom used against the bites of the ordinary cobra could be useful for a bite from this snake as well. It lays eggs and the snakes hatch out before the monsoons.

Bungarus coerulas (Common Indian Krait): This is locally called *Kaner*. It is steel blue in colour with white cross stripes all over the body. In the centre region of the upper surface, it has one row of hexagonal scales. In the lower region of the tail beyond the anus, the ventral scales are single. It lays eggs before the monsoons and the new-born of the krait are as poisonous as the adult. It

feeds on snakes, lizards and rodents and is cannibalistic in nature.

The poison of this snake is neurotoxic and for an ordinary sized man, just 6 mg would be a fatal dose. In the case of the cobra it is 12 mg which means that the poison of this snake is twice as toxic as that of a cobra. The bite does not give any pain or cause any swelling and the patient just sleeps to death. The only remedy against this poison is anti-venom.

Enhydrina schistosa (Hook-Nosed sea snake): This sea snake is called *Kusada* in Konkani and is found all over Goa in the coastal regions. It is deep grey in colour with chocolate brown stripes crosswise all over the body. The head is small and the lower part of the body is cohesed to form a small ridge at the base and the tail has become completely flat like an oar. The fisher folk often encounter it in their catch and they throw it on the beach. Unfortunately, this snake cannot move on the land surface as its body is adapted only for swimming. It therefore dies when kept on the beach and one can see these snakes dead on the beach.

It is very poisonous (four to eight times that of a cobra), but the poison fangs are situated slightly at the back of the jaw and it does not get a good grip to give a lethal bite. The snake feeds on fishes, frogs and a number of marine fauna. The venom is highly neurotoxic and a good anti-venom could save the victim. Recently, this snake venom has been fractionated and some of the fractions have been marketed for therapeutic purposes.

Vipera Russeli (Russel's Viper): This is the *ghonus* or *agio-mandol* of Goa. The snake averages about 1 m in length and is about 10 cm in girth. The head is triangular, with very thin scales. The body is brown with three chains of elliptical marks, one over the dorsal and two on the lateral sides of the snake. There are sometimes white borders to these elliptical marks which are normally grey in colour.

This snake prefers deep vegetation and lies curled up with its head in the centre. When approached, it makes a deep continuous hissing sound as a warning to people to keep away. It darts ferociously at the victim, taking its fangs out from a sheath and burying them deep in the body. The fangs are nearly one centimetre long and are hollow, enabling the snake to inject quite a copious amount of venom. The venom is vasotoxic and it gives very painful reactions at the site of the bite and plenty of swelling, which spreads all over the limb apart from oozing at the site of the bite. The venom brings down the clotting level time of the blood of mammals. It is a common sight to see patients start bleeding from the nose, gums and kidneys. There is always haematuria in patients on account of this bite. Only an anti-venom saves the patient who otherwise dies of heart failure.

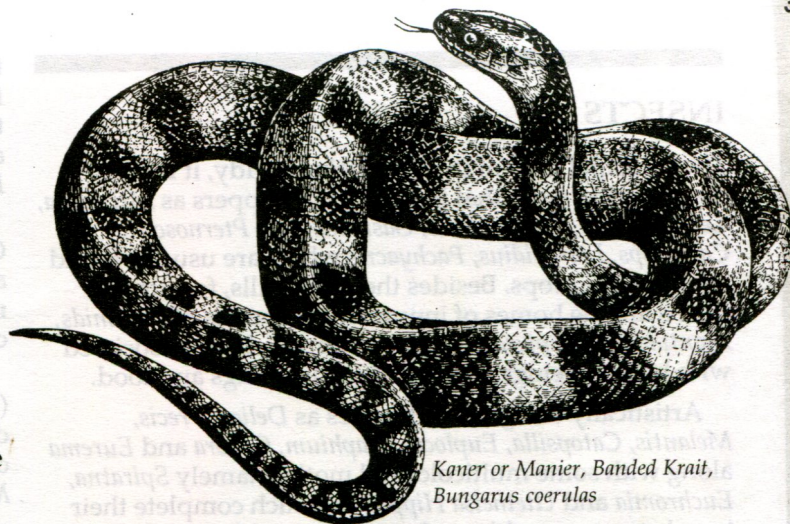
The snake feeds on mammals and frogs, and before the monsoon lays young ones directly. The female lays about 20-40 young ones. There is quite an amount of cannibalism in the young snakes.

Echis carinatus (Saw-Scaled Viper): This is the common *phorse* snake of Goa. It is very common and is found in red soil. It grows to a maximum of about 40 cm and can be seen during the rainy season in the soil between stones and often near houses in the farms. It is grey in colour with variegated patterns looking like cross bars on the

dorsal sides that run across lateral grey lines at the sides. The head is triangular and it carries a grey arrow headed mark which is the characteristic of this snake. The scales on the side of the body near the neck are serrated and as the snake rubs these scales against each other, it gives out a continuous sawing sound which can be heard from some distance. It feeds on insects, scorpions, lizards, small frogs, small mice and even tiny snakes.

The amount of venom injected by this snake being small, the patient does not die immediately but there are side reactions and the patient may succumb to these secondary causes. He starts bleeding from the nose, gums, kidneys and the complications continue for a number of days. Some putrefaction also takes place at the site of the bite which is often swollen and shows symptoms of intensive oozing. There is quite an amount of burning pain at the site of the bite. Fortunately, these snakes are quite small and the bite is therefore rarely fatal. This snake bears 4-8 young ones before the monsoons. These are as poisonous as the adult. Anti-venom is a sure remedy against the bite of this snake.

Trimeresurus gramineus (Bamboo Pit Viper): This snake is locally called *chapte*. It is a green pit viper growing to around 40 cm on an average. The head is triangular and there is a pit below the nose which is receptive to the temperature of the surroundings. It also hisses now and then. There are white and black spots on the green body. The under surface is light yellow. It is often times found on trees, especially in the region where bamboo is planted. The green colour is of a deep green shade like the tree leaves and unlike the whip snake which is parrot-



Kaner or Manier, Banded Krait,
Bungarus coerulus

green. The venom is vasotoxic but these snakes are usually small and their venom is low in toxicity, so bites are rarely fatal.

Other snakes found in Goa but not discussed:

<i>Plocturus canaricus</i>	The Shield Tail snake
<i>Boiga forestoni</i>	The Forsten Cat snake
<i>Amphiesma beddomei</i>	The Beddomes Keelback
<i>Macrispisthodon plumbicoron</i>	The Green Keelback
<i>Cerberus rhynchops</i>	The Dog-faced Water snake
<i>Callophis Sp.</i>	The Coral snake

Fear of Snakes

Most people fear snakes. Yet, contrary to popular belief, very few are poisonous. A total of 238 species of snakes are found in India. Out of these, only 4 can cause fatal bites. These are known as the "big four" and include the cobra, the krait, the Russel's viper and the saw-scaled viper.

To avoid snakes near one's house, a few precautions should be taken. One should clear rubbish, fill rat holes around the house, cut tree branches and creepers touching or overhanging the house, and wear boots when moving around in a wooded area.

In case one still encounters a snake at a distance of less than two metres, all one should do is stay still. Snakes have very bad eyesight and respond only to movement. You can talk as loud as you want, because snakes are deaf. Slowly pull a handkerchief from your pocket and wave it in front of the snake. Then throw it in the opposite direction and make your getaway. If the snake is inside the house, a long stick can be used to slowly lift the snake and put it outside the house. There is no danger involved in doing this because snakes cannot jump. You could also call me at 278740 and I would be happy to come and take the snake away.

Despite all these precautions, in case a snake bite still occurs, avoid panic and keep the victim warm and reassured. No stimulants such as tea,

coffee or alcohol should be given. No attempts should be made to suck out the poison or cut the wound to release the poison as this could result in blood loss and infection. No tourniquet should be tied, as a tight tourniquet may result in gangrene leading to amputation of the limb. The patient should be rushed to the nearest hospital where anti-venom is available.

There are many myths regarding snakes. Some of them are dealt with in the detailed descriptions of snakes already given. I would like to discuss a few of them and prove them wrong with the help of scientific facts, as these myths cause great harm to snakes. The most common myth is that the snake is a revengeful reptile with an excellent memory, which will track you down even after the passage of many years. In reality, snakes have a very small brain and cannot remember what happened even a few minutes ago. They live purely by instinct. Some snakes are believed to drink milk and villagers will swear that they have seen a snake coiled round the legs of a cow, drinking milk from the udders. Snakes have very sharp teeth and no cow is going to tolerate a snake sucking her milk. Secondly, a snake has no sucking apparatus; its diet includes live rats, frogs and small mammals and lizards. When snakes are force-fed with milk by snake charmers, the milk often ends up going into their windpipes, causing allergic reactions and pneumonia, even-

tually killing the snake. Basically, snakes are harmless and timid animals, always avoiding humans.

The last topic I would like to deal is that of so-called snake charmers. There are actually no such people; what we have in reality are snake torturers. These characters are found in plenty at the Anjuna flea market and other tourist spots. If you care about snakes, don't patronise them. Snakes are deaf and the music that the charmers play is only to fool the spectator. The poor snake is scared to death and raises his hood only in defence against its giant tormentor. Cobras are poisonous and so their fangs and glands are brutally slashed off. Without venom and teeth the snake dies a painful death in about two months. If you see a snake charmer in operation, report it to the Forest Department or call any animal rights activist group.

I don't expect everyone to love snakes for themselves. But tolerate them and they will tolerate you. Remember, both of you have an equal right to exist on this earth. Also remember that 30% of India's foodgrain supply is consumed by rats. This figure would be far less if their natural predators, the snakes, were allowed to live in peace.

Rahul Alvares

INSECTS

The principal crop of the state being paddy, it invites many paddy pests that include grasshoppers as *Mecopada*, *Cenecephalus*, *Chrotogonus*, *Gastrimargus*, *Pternoscirta*, *Catantops*, *Lotropidius*, *Pachyacris* which are usually found affecting the crops. Besides these, the hills, forests and plains are the homes of innumerable species of *Phasmids*, *Mantids*, *Dermapterans*, and *Blattids* which are associated with human beings, sharing their dwellings and food.

Artistically designed butterflies as *Delias*, *Precis*, *Melantis*, *Catopsilla*, *Euploca*, *Graphium*, *Capora* and *Eurema* along with some multicoloured moths, namely *Spiratna*, *Euchromia* and *Utetheisa Hippotroon* which complete their larval stages on cultivated crops, vegetable and timber trees, affecting the economy adversely, are commonly found. Lacewings (*Neuroptera*) having transparent wings are not uncommon near waters. The common species are *Palpares* sp., *Echthromyrmex* sp. and *Acantheaclisis* sp. Apparently very similar winged hovering insects are the Odonata—Dragon and Damsel flies, which are represented by *Ceriagrion* sp., *Indophaca* sp., *Vestalis* sp., *Neurothemis* sp., *Orthetrum* sp., *Pantala* sp. and many others.

The insects that concern the economy of forest timber belong to the group *Isoptera*—the social white ant. The species that abound the forests are *Odontotermes* sp. and *Microtermes* sp. which are found to affect coconut, comba, cashew trunks and woodlogs.

Ants, bees and wasps (*Hymenoptera*) are innumerable and are found to be occupied in their active routine duties, some being predators, such as potter wasps and Sphegids represented by *Eumenes* sp., *Tregaspidia* sp., *Multilla* sp., *Ampulex* sp., *Ammerphila* sp., *Sciphron* sp., and *Cerceris* sp. Brilliantly shining metallic toned bees bumbling through the glades and gardens visit from one flower to another pollinating them. Some common species are *Xylocopa* sp., *Anthophora* sp. and *Micrapis* sp. The industrious ants outnumber other insects; the common forms found in the forest and gardens are *Dorylus* sp., *Oeophylla* sp., *Camponetus* sp. and *Pompilus* sp.

Bugs (*Hemiptera*) abound in water and land. Some are adapted to swift flowing streams, e.g. *Cylindrostethus*, and some are found in water puddles as *Anisops* sp., *Enithares* sp., and the thin pin-like *Hydrometrid* bugs. Aphids,

though microscopic, suck the juice of vegetables and fruits turning them pale and introducing diseases in them. Various species of bugs that affect the crop fruits and vegetables belong to the groups of *Lygacids*, *Pentatomids* and *Phyrritocorids*.

Beetles (*Coleptera*) vary from microscopic sized *Chaetonema* to large sized *Scarabacids*. Some beetles such as *Coccinella* sp., *Menochihts* sp., and *Bumus* sp. are, as a matter of fact, friends of farmers since their predation on other injurious insects helps in protecting human food.

The highly specialised insects are the true flies (*Diptera*). These are associated with fruits, flowers, decaying organisms, etc. and are carriers of infectious diseases to the living world. These are represented by *Muscids*, *Asilids*, *Bomblids*, *Syrphids* and many others.

Butterflies — Butterflies, the most beautiful of all winged insects belong to the phylum *Arthropoda* and order *Lepidoptera* (*Lepidus* means scales, and *Pteron* means wing). Butterflies have tiny powdery scales on their wings. In the Indian subcontinent, about 1500 species of butterfly have been recorded. The Western Ghats and North-East India are particularly blessed with a large number of diverse and beautiful butterflies. About 65 species of butterfly have been recorded in Goa. Seven families of the butterfly are represented in Goa: *Papilionidae* (swallow tails), *Danaidae* (tigers, crows and nymphs), *Satyridae* (browns), *Pieridae* (whites), *Nymphalidae* (rajahs, sailers, fertilaries), *Lycaenidae* (pierrots, blues), *Hesperiidae* (awls, skippers).

Southern Birdwing (*Troides minus*), the largest butterfly to be found in India—with a wingspan of 19 cm—is commonly seen in Goa. Grass Jewel (*Freyeria trochilus*), the smallest butterfly in India—with a wingspan of 1.5 cm—is also found in Goa. Some other beautiful butterflies found in the State are Malabar Tree nymph (*Idea malbarica*), Blue Mormon (*Papilio polymnestor*), Common Jezebel (*Delias eucharis*), Tamil Lacewing (*Cethasic neitneri*), Yellow Pansy (*Junonia hierta*), Peacock Pansy (*Junonia almona*) and Painted Lady (*Vanessa cardui*).

Butterflies are sun-loving creatures with a strong territorial instinct. The territory may vary from a few sq ft to several sq mts. This area is guarded jealously from other intruding butterflies. Butterflies lay eggs on specific plants, which are called mother plants because the larvae that hatch from the eggs feed on the vegetative parts of these plants. Butterfly larvae are voracious feeders. Life-spans vary from a few weeks to some months and are influenced by factors like climate, availability of food etc.

Butterfly larvae are totally dependant on specific plants; if these plants are eliminated, you effectively eliminate the butterflies as well. We are on the verge of losing many species of butterfly due to habitat loss. A large number of butterflies are illegally collected and killed by butterfly collectors. These are used in making gift items and souvenirs or for private collections etc. This collection of butterflies is carried on illegally throughout India. Collected butterflies are illegally smuggled to the West where they command high prices. There should be awareness among the law-enforcing authorities and the general public about this. Universities and other Institutes should discourage projects which call for the collection of butterflies.

Paresh Porob

Common mormon



Wild Edible Mushrooms

Conflicts between local people and forest officials are, to a certain extent, inevitable. Even sensitive forest officials who are sympathetic to the needs of people dwelling in and around forest areas often find themselves preventing various activities of the villagers in forest areas. The extreme poverty of many forest-dwelling groups combined with differing perceptions of the goals of forest management lie at the root of this conflict.

The forester rightly feels that protection of the forests and biodiversity conservation are among the primary objectives of his work. Increasing population pressure and poverty may sometimes lead locals to exploit forest areas beyond sustainable limits. The forester seeks to prevent this and conflict arises.

An example of this kind of situation is the issue of collection of Non-Timber Forest Produce (NTFP). The Forest Department has traditionally been disdainful of this produce and prefers to focus on timber-trees. For villagers, on the other hand, NTFP is the primary produce of the forest. The contracts for NTFP collection are auctioned by the Forest Department and forest-dwelling communities have traditionally been allowed NTFP collection-rights for personal use.

Conflict arises when these rights are sought to be restricted as in Goa, where the Government has prohibited collection of mushrooms in the wild. The rationale for this decision was a detailed note put up by Dr. Nandkumar Kamat, a noted expert on mushrooms. Dr. Kamat gives the background:

'There was no knowledge of Goa's wild edible mushroom biodiversity before I began my exhaustive research in 1986. I surveyed the entire Western Ghats of Goa (including sanctuaries), met hundreds of locals and also conducted a market survey in 14 places to see the scale of the mushroom trade.

'It came to my notice that since 1980-81, people have been overexploiting precious wild edible mushrooms since these fetch a good price in cities; so much so, in fact, that they do not eat these mushrooms themselves. There are tens of middlemen in Sanguem, Sattari and Ponda who encourage people inside sanctuaries to collect *Termitomyces* mushrooms. Not even 5-10% species are left in the habitat to mature and produce seeds.

'On the basis of five years of field and market studies, I submitted a detailed scientific note to the Conservator of Forests to declare a ban on collection of mushrooms in 1991. The ban is actually automatic under the Wildlife Protection Act, which says that no minor forest produce can be gathered from protected areas. Countries in Europe have enforced even more stringent bans on wild mushroom collection for consumption.

'A ban was necessary in order to protect endangered species of wild *Termitomyces*. (There are



Termitomyces heimii on an anthill in Canacona in its natural habitat

in all 25 species in Goa; 15 are found inside sanctuaries, 6 are rare and endangered). Goa has the world's largest gene pool of *Termitomyces* mushrooms which needs conservation. Unfortunately there is no ban on wild mushroom collection in private forests/area outside sanctuaries. Because of this Goa has lost a rare species named by me as *Termitomyces gomantakiensis* found in Dhulapi, Tiswadi.

'Local people have no knowledge of the ecological aspects/impacts of overexploitation. They are influenced by market forces and their personal poverty. Despite the ban, the plunder of these resources continues. The situation has reached a point that during the past 10 years, I have not been able to collect a single sample of 3 species of wild mushrooms. These are probably lost. Environmentalists might have emotional investment in macrospecies like tigers and lions—but after all, a living species is a living species—big or small.

'One must take into cognizance the diversity and richness of the *Termitomyces* gene pool in Goa. There are 25 species belonging to the two genera—*Termitomyces* and *Podabrella*. Of these local people used to market 15 species—all of *Termitomyces*. For the past 10 years only 5 or 6 appear in the market due to overexploitation. Actually the ban has not benefitted much except to discipline the people in sanctuary areas—the degradation of the gene pool outside the sanctuaries continues.

'Similar pressures are operating on wild edible tender bamboo shoots and an estuarine fern called Ankur (*Achrostichum* species). The problem is that urban consumers are willing to pay very high prices for these items.

'People in/near sanctuaries have been informed about the availability of free training programmes

for them on the cultivation of commercial mushrooms. Instead of destroying wild resources they could cultivate the oyster mushroom species.

'The Directorate of Agriculture (since 1985) and since 1998 the Goa State Horticulture Corporation (since 1988) has been conducting free oyster mushroom cultivation training programmes. So far I have addressed 1500 trainees from all over Goa including 300 from the sanctuary areas—explaining to them for 2 hours using colour slides and transparencies the ecological facets of Goa's wild edible mushrooms. It is heartening to see the response of the people, who fully support the government's conservation effort.'

Dr. Kamat's note highlights a type of conflict that has no ready resolution. When taking any conservation related measures, the authorities should always study the ways in which livelihoods of local people will be affected, and take measures to provide alternatives, as they appear to have done in this case by providing training in mushroom cultivation. This type of initiative must, in fact, be an integral part of any conservation plan.

Else, one may see the kind of situation that has been reported from some sanctuary areas. Here, local people have become completely alienated from the forests on which they depended, due to draconian forest laws; so much so, in fact, that they begin to identify the forests as the cause of much of the oppression they face from the Forest Department authorities.

One does not want to see this happening in Goa as well. In the meanwhile, however, the trade in mushrooms continues. Season after season, villagers flood the cities of Panjim and Mapusa and openly sell mushrooms to eager city folk for whom the conservation of the mushroom is as remote an issue as several other issues affecting ecology in the State.

MANAGEMENT OF FORESTS

Portuguese Period — The practice of systematic forestry in Goa may be said to have begun with the religious orders, mainly the Franciscans and the Jesuits. The latter insisted on the use of only seasoned teak wood for construction of large churches built by them from the mid-16th to the early 18th century. They took great care in the protection of tender trees. The Jesuits were also experts in grafting techniques as well as in ascertaining the seasoning period of each variety of trees. They were responsible for artificial plantation in several open areas under their jurisdiction. The massive teak plantations running from Nuvem to Vaddem and passing through the villages of Verna, Nagoa, Cortalim, Sancoale and Chicalim in Salcete and Mormugao Talukas, are attributed to these efforts of the Jesuits.

On April 21, 1771, Marquis de Pombal, Prime Minister of Portugal created the '*Intendencia Geral de Agricultura*'—an office to look after agriculture and forestry in Goa. This office, which was started in 1776, was closed in 1834 and a post of '*Administrador das Matas de Goa e Nagar Aveli*' (Administrator of Forests of Goa and Nagar Aveli) was created. Several forest officers came from Portugal to be in charge of the Forest office. By decree dated August 17, 1912, the '*Direcção dos Serviços Agrícolas e Florestais*' (Directorate of Agriculture and Forests) was created. In 1920, this Directorate was named as '*Direcção dos Serviços Agrícolas, Florestais e Pecuária*' (Directorate of Agriculture, Forests, Fisheries and Animal Husbandry). In 1958, the aforesaid Directorate as well as the Directorate of Mines and Industry and the office of Statistics were brought under one combined Directorate known as '*Direcção dos Serviços de Economia*' (Directorate of Economic Services). After Liberation all the offices under the Economic Services, including Forests, came under the purview of the Development Commissioner.

Administrative Setup — The forest administration in Goa was under the charge of a Forest officer (*Engenheiro Silvicultor*)—a licentiate from *Instituto Superior de Agronomia*, Lisbon. The forest area in Goa was divided into 18 zones, each under the watch and guard of a Superintendent (*Chefe de Zona*). Each Superintendent had under him two to three Forest Guards and 12 to 15 sepoys belonging to the Rural and Forest Police (*Corpo de Polícia Rural e Florestal de Goa*).

For the purposes of conservation, exploration and development, the forests of Goa were classified as Reserved and Non-reserved (Protected).

The reserved forests were subjected to periodical treatment as under:

1. Felling of trees to ensure cleanliness of forest areas and plant hygiene (*Cortes de limpeza*)
2. Periodical trimmings (*Desbastes periodicos*)
3. Reduction of competitive plant population under the heading of smaller shrubs (*Cortes de reducao*)
4. Clearing areas for nurseries (*Cortes de sementeira*).
5. Selective felling (*Cortes de seleccao*)
6. Clear felling in case of seasoned trees only (*Corte final*).

The non-reserved or protected forests were those not subjected to the treatment meted out to reserved forests. For the purpose of exploration, the existing rights in reserved forests, were settled, transferred or commuted, while in the protected forests they were recorded and regulated. To put it otherwise, in a reserved forest everything was an offence that was not specifically permitted, while in a protected forest nothing was an offence that was not explicitly prohibited.

Thus, the forest policy declared by the Government laid down the broad principles under which forests of different types were to be administered. Successful implementation of this excellent forest policy resulted in a steady development of the forests in the territory. For nearly 130 years, forests were continuously conserved. The thick growth of our forests could be seen while travelling from Ponda to Darbandora in the North, or in the South, while going from Karmal Ghats to Canacona. Trees with normal diameter of trunks ranging from 45 cm to 110 cm were a common sight.

Demarcation and Survey — Between the years 1919 and 1927, works of survey and demarcation were carried out with the aim to determine with precision the forest area. These works comprised:

- a. Marking of the correct limits of Goa's forests by setting permanent stone marks to enable the government to provide sufficient evidence in the court of law in case of any juridical conflict.
- b. Survey on a large scale of demarcated areas with planimetric details of the forests, parcellar divisions, etc.
- c. Measurement of areas. Preparation of plans in the scale of 1:5000 and 1:2000.
- d. Listing of forest species existing in each division as a preliminary study for the organisation of forest inventory.

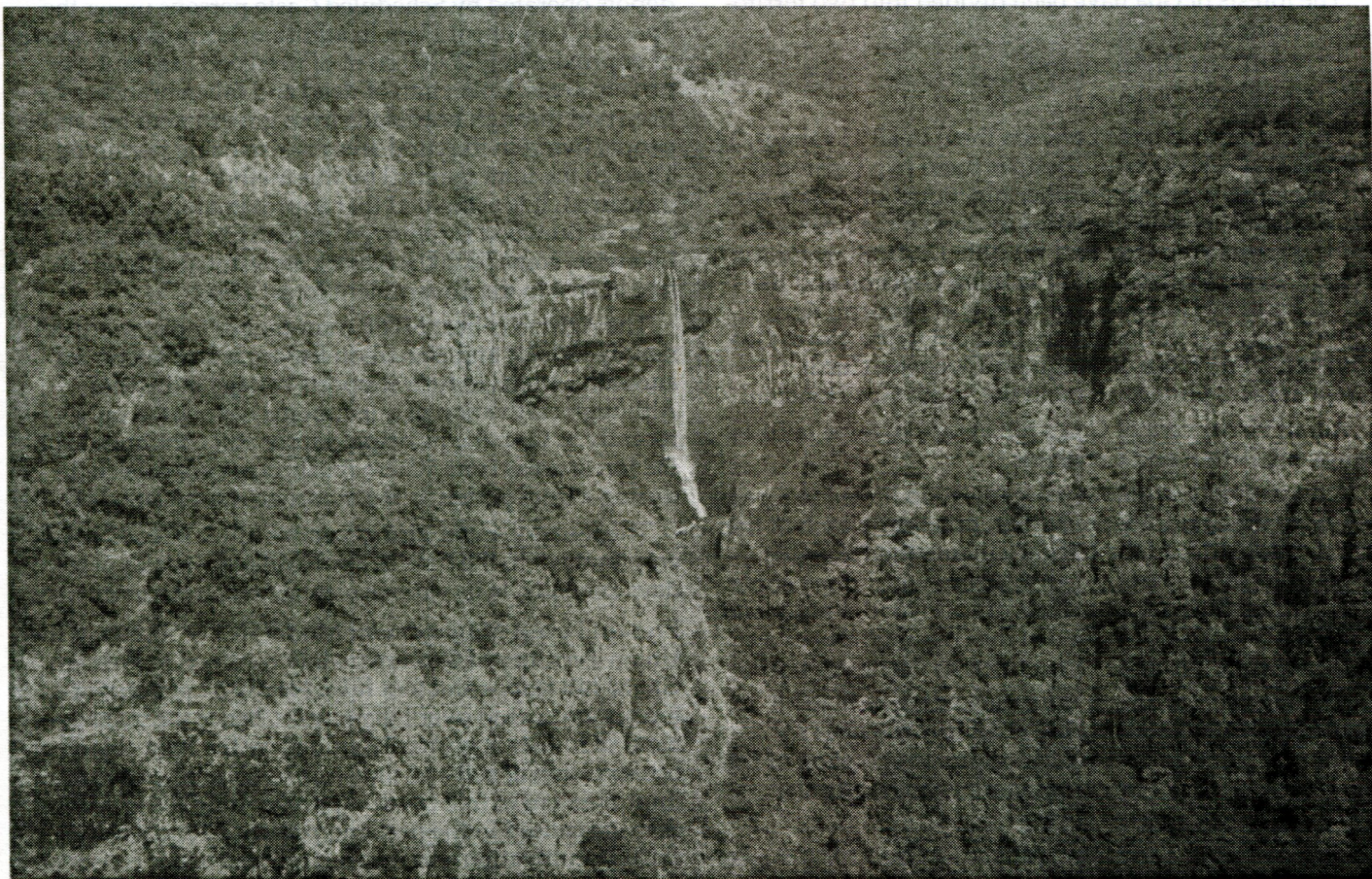
By 1927, survey of nearly 9000 hectares was completed. Since the works were quite slow, the government enacted the Legislative Diploma No.272 dated April 18, 1927, stressing the need for the expeditious completion of the cadastral survey of the whole territory. Prior to liberation, all these works were carried out flawlessly.

There was some depletion of the forest capital due to construction of roads as well as abuse of user's rights, shifting cultivation, illicit fellings, annual fires, etc. However, this affected a very small percentage, and once under the arm of the law, was dealt with severely.

Post-Liberation Period — Soon after liberation, an official report described the forests of Goa to be in a very poor condition, claiming that during 'the Portuguese period, there was no separate forest department and that no systematic work was done for the preservation of forest resources or for artificial plantations.' The report further added, '...the task before the new government was to regenerate Goa's forests on modern lines.'

In order to carry out the new policy of 'regeneration', the following measures were taken by the government from 1962-76:

1. Large reserves of 'teak', 'sissoo' and other native species were given on tenders for coupes in reserved areas and cut down mercilessly.
2. A network of forest roads was opened to ease the removal of forest products, thereby reducing the forest areas.



Laadkyacha ozar, Surla

3. Species alien to Goa's forests and of doubtful efficacy were planted (eucalyptus, rubber), depleting Goa of wildlife due to habitat disturbance.

4. Bulk plantation was restricted to teak, eucalyptus and cashew, setting aside the traditional species so familiar to Goa.

Along with the 'regeneration' policy mentioned above, other activities were also taking place in forest areas, such as:

1. Deforestation in areas by the mining industry.
2. Irrigation projects and other developmental activities in hilly areas (Selaulim, Anjunem, etc.)
3. Rapid urbanisation and building activity in areas hitherto covered by forests. Green areas and nature reserves were converted.
4. Unchecked activities of forest contractors and timber smugglers under political patronage.
5. Allotment of land to the landless as part of the 20-point programme, utilizing government-owned forests.

As a result of the above policy, the area under forest came down to 22 per cent, or even less, in the last 30 years. According to the Forest Department, the main causes of deforestation are mining activities, accelerated rate of developmental activities and urbanisation, *kumeri* (shifting) cultivation and distribution of forest land by the government to the landless for agricultural purposes. The Forest Department, however, does not comment on the fact that a fairly impressive amount of deforestation has been carried out by MLAs and timber merchants in collusion with Forest Officials, who have cut down a large number of trees using their political influence. More than 500 hectares of forest disappear every year.

Kumeri cultivation, which is said to be one of the main causes of deforestation, has been officially banned for the last 30 years though tribals claim that some of them still practice *kumeri* today. The Forest Department has regularised only 2000 out of an estimated 20,000 *kumeri* cultivators. The issue of *kumeri* is discussed in greater detail in Chapter 4.

Administrative Setup — The present state of Goa's forests is really nothing to be cheerful about. For at least a decade, Goa's environmentalists have been screaming themselves hoarse over the decline of forest cover in the state.

A forest is a closely-knit community or ecosystem of genetically stable, locally occurring trees, shrubs, climbers and flora which goes through a natural cycle of growth, disease and repair, if left to itself. A forest has its own microclimate. A mere group of trees is not a forest.

If this criterion were to be applied, then the total area under forests would actually be only half what is officially stated. In this way, the government statistics regarding area under forest would certainly seem to mislead since they relate to land classified as forest, which is hardly the same as area under actual tree cover. A tract of barren land surrounded by a few trees is, for instance, also regarded as a forest area when a survey is being undertaken. So it can be said that the area under dense forest in Goa is probably 2 per cent of the area of the State.

According to Dr. Meher-Homji of the Pondicherry School of Ecology, hardly 2.5 per cent of the land area remains under good dense evergreen forest.

The forests of Goa have been divided into two territorial divisions:

1. North Goa Division, and,
2. South Goa Division

These divisions have between them in all 11 ranges, 29 rounds and several beats. Besides these two territorial divisions, there are seven other functional divisions, viz. the Cashew Division operating at Ponda; the Research Division, Working Plan and Wildlife Division operating at Panjim; the Statistics and Planning Division and the Social Forestry Division. The forests of Pernem, Keri, Valpoi, Ponda and Collem are covered in the North Goa Division while those of Sanguem, Quepem, Curdi, Pissosnem and Canacona are in the South Goa Division.

About 90 per cent of Goa's forests are in three talukas: Sanguem, Sattari and Canacona.

A major non-government organisation linked to forests in Goa is the comunidade. Earlier, practically each of the 250 comunidades in the territory maintained sizeable tracts of forests under its control, from which the people would draw their requirements of fuel wood, fodder and small timber. But the decline of the comunidades as an institution has left these forest tracts in desperate shape.

At the present moment the principal concern of all environmentalists is to evolve practical strategies for maintaining and enhancing the original vegetation of this small state, not only for our own survival but for the future of our children as well.

Reversion to Conservation Policies — Until 1977, forests were managed under a clear felling system followed by artificial regeneration of species like teak, eucalyptus and cashew. After 1977, the clear felling system was discontinued in areas along the Western Ghats. Most felling has come to a complete halt after the promulgation of the Forest Conservation Act in 1980.

With the promulgation of the FCA, the Forest Department was asked to turn over a new leaf. Its earlier orientation, that of felling trees for revenue, was now sought to be substituted by a conservation-oriented policy. Within a few years after the FCA was notified, the Environment Ministry sought to link the needs of local communities to the policies of conservation, making such needs one of the priority areas, at least in theory.

The Forest Department still earns revenue, but this is largely from the surplus end-products of forest areas. According to the Conservator of Forests, raw materials are supplied to a large number of small and medium scale industries. Annually, about 300 cu m of timber salvaged from government forests is auctioned and about 20,000 cu m of timber is made available through licences given for tree felling in private areas. This material goes to support 98 saw mills and 203 carpentry units as well as individual carpenters who are engaged in the manufacture of carved furniture, which is a speciality of Goa.

Annually, about 80,000 canes (each of 12' length) are supplied to registered cane units for the manufacture of furniture and other articles. Some of these units, like some of the carpentry units, also import raw materials from outside the State to augment their needs.

About 8000 cu m of firewood salvaged from government forests is annually sold to the public, the Sanjivani Sugar Factory, various crematoria, jails, and firewood

depots operated by Scheduled Caste persons under the Special Component Plan. In addition, licenses for removal of approximately 25000 cu m of firewood are issued in private areas. Collection of dead and fallen branches for firewood through headloads from government forests by people living in the rural areas is also being permitted. Though the total removal by this method has not been measured, it is estimated that approximately about 3 lakh cu m of firewood is removed annually in this manner. Likewise, some 55,000 livestock are estimated to graze free of cost in the government forest areas.

The right to collect NTFP (non-timber forest produce), mainly *shikakai* and cinnamon leaves, is also auctioned annually, which in turn supports cottage industries. Although cultivation of mushrooms has started only recently in Goa, the principal source still continues to be the forest areas from where mushrooms are collected during a brief period in the monsoon season (see p.41)

The forestry sector also generates much needed rural employment to the tune of approximately 6 lakh person days annually, in its various plantation and other activities.

Present Forest Management Model — The forests of the Union Territory of Goa are mainly confined to Western Ghats' hill slopes and foot hills. Nearly 82 per cent of forests are spread over hilly terrain, hence the management of forests is primarily guided by the twin objects of conservation of soil and moisture over hilly terrain, and improvement of tree cover. Apprehending the gravity of damage caused in the past and present by incessant shifting cultivation and mining, soil and water conservation are now receiving maximum attention. The other objects of management, namely the supply of fuel wood and timber to the local populace, improvement of growing stock and preservation of wildlife, will remain the same as in any other management model.

Whereas other States with forests have long introduced schemes of Joint Forestry Management (JFM), Goa has yet to make any significant move in this direction. It is imperative to involve local people directly in the management of existing forests and in programmes for rejuvenation of degraded forest areas. JFM schemes are not always successful, since the chief obstacle to their effective implementation is the attitude of even senior forest officers who still reject outright the idea that people can be seen as anything better than nuisances out to create trouble.

If local people are not involved in the protection of forest resources and are seen as outsiders and potential threats to the protection of forest resources including wildlife, there is not much basis for optimism.

There is already considerable poaching in existing wildlife areas. Wildlife activists have adequate proof that even large animals like the tiger are being poached. Sometimes, an entire village may be involved in the poaching of a large animal like the sambhar.

The problem is bound to aggravate in the years ahead. Therefore, radical solutions are the need of the hour. These must be rooted in a partnership between local people and forest department, with benefits going to both. The department should boldly experiment and hand over small areas for management wholly to village communities for some years. If the results are positive, such experiments can be made permanent and extended.

Source: Survey of Goa Forests, FSI (1985)

The Dhangars

Not much is known about the Dhangars (Gavli-Dhangars) and their life-style. This may be due to two reasons: one, most of the Dhangars live in very widely dispersed small settlements in near inaccessible regions in the Western Ghats. There is little incentive and too many obstacles for a researcher from the plains to make the arduous journey to these regions for any academic purposes. Two, the Dhangars are a marginal group, unorganised, without political clout, gradually and inexorably moving further into poverty. No one is really interested in them or their quality of life. They are considered too poor to be of any interest to people who count.

Dhangars are found distributed in southern Maharashtra, Goa and Northern Karnataka. They are believed to originate from Maharashtra and speak a corrupted version of Marathi. For the Dhangars, the forests form an integral part of their environment and life-style. In earlier times, they were mostly nomadic cattle herders (with some sheep and goats), moving constantly through the forests and temporarily settling down only for the four rainy months of the year. Deforestation and a modern forest regime, which has dispossessed them of the right to graze their animals in the forests, has changed all that.

The Dhangars were known for the dairy products they used to sell, mainly *ghee* (clarified butter), *loni* (butter) and *khava* (a type of condensed milk used in Indian sweets)—skills encapsulated in their name—'Gavli' (milkman). Their intimate knowledge of trees enabled them to use not only wood for their homes but leaves and herbs as medicines for themselves and their livestock, and engage in the collection of wild honey for sale. For survival, they engaged in subsistence agriculture, patches of land being put under *kumeri* cultivation for the growing of *nachne* (ragi, a coarse millet). The question of ownership of land was never considered to be important, as their life-style was nomadic.

Unlike the Gavde, the Dhangars still continue their tribal life-style, and are, therefore, Goa's only existing tribal community in the strict sense of the term, though they have yet to be classified as Scheduled Tribes, with the benefits that this would bring. They are concentrated in the Morlemghor-Vageri complex of the northeastern Sahyadri mountains in Sattari while a few of them can be found in Ponda and Sanguem. Over the past decade, the forces of so-called development have transformed the community from a past of inaccessible habitats, rich forest environs and a self-sufficient, traditional, buffalo-rearing occupational pattern to a surprisingly docile group dependent on plainsfolk for their livelihood.

The Dhangars have borne the brunt of many rapid changes occurring in the forest areas of Goa soon after liberation. Deforestation began in right earnest and with natural forest being felled by the Forest Department to make way for commercial

plantations of teak, rubber and cashew, both the thick undergrowth and grasses, which provided free fodder for their animals, were cleared out. Numerous fines were extracted from these unfortunate forest-dwellers if their buffaloes strayed into now protected territory. The clearing of the natural forests also led to the proliferation of exotic weeds like eupatorium, which completely colonised the forest floor. These weeds are useless as fodder and are, in fact, harmful to such



Inside a Dhangar house

cattle as may consume them.

The Dhangars of Goa had, therefore, to move further and further into the wilds, often crossing the borders into the neighbouring states of Karnataka and Maharashtra. But this was a doomed strategy, for not only were their lives and those of their animals put into considerable danger, but the distant wanderings created problems for selling their milk. And in the neighbouring states, they met with the same forestry regime that deprives forest-dwelling communities of their age-old rights forest rights and gives them nothing in return. So the Dhangars have returned to the borders of the forests again with vastly diminished herds. They find it difficult to maintain even these small herds of 8-10 buffaloes in the dry period when fodder is not available and the animals are not in milk.

Being experts in the maintenance of milch animals, the Dhangars should have been brought into the forefront of the so-called white revolution, which took place under the programme 'Operation Flood'. The white revolution has, however, only ended up pauperizing and displacing them completely. Once the Dhangars produced excellent *loni*, which was in great demand as far away as Panjim and Margao. Twenty years ago, Dhangars would walk several kilometres with kilos of butter neatly packed in leaves and found

a ready market for their homemade produce. The butter was so pure that when it was heated to be made into *ghee*, no residues remained.

Operation Flood put an end to that. Today the *loni* is no longer available. All available fresh milk goes to the imported chilling plant located at Ponda which now removes the fat and sells it off separately in the form of *ghee*. The Dhangars were encouraged to sell all their milk to the local dairy cooperatives and have stopped the production of *loni*. Development has done nothing more spectacular than transferring the jobs of the weak and the poor to those already privileged. This is symbolic of modern India: existing jobs are traded for imported machinery so that developed countries can continue to maintain their jobs and their high standard of living.

The Dhangars were happy to receive cash for their fresh milk, but the liquor vendors in the dairy villages were even happier to grab the same cash once the dhangars took to drinking alcohol, something they succumbed to all too easily as they came into increased contact with the settled peasant communities in areas bordering their forest habitat. No greater misfortune could have befallen the community than their fatal encounter with development and alcohol.

Today, in Vagheri, a little over ten people still grow *nachne*, a crop that once featured as the staple in their diet. Rice and wheat are purchased instead from the market and this further increases their cost of living. There is a growing trend to take to employment elsewhere, either as casual labourers or caretakers of milch animals.

The practice that a few years ago was only restricted to the lean periods of the year is now acquiring a permanent character.

The Dhangar communities, small as they were, have been destroyed and they eke out an existence of the most grinding poverty. Their plight is a depressing lesson of what the zeal for commercial exploitation of forests (and even conservation) can lead to, when the forest-dwelling communities who are the ones to be deprived of their traditional rights are not adequately compensated and rehabilitated.

It is incredible but true that there is not a single social worker or NGO which has moved out to assist the Dhangars in their depressing tryst with development, especially modern dairying. The Government of Goa has let them go to the dogs.



WILDLIFE SANCTUARIES

With the notification of two more sanctuaries in June 1999, Goa now has one National Park and six Wildlife Sanctuaries. Almost 755 sq km (about 62% of the total forest and 20% of the total land area of the state) is now protected, and things are beginning to look up for the wildlife in Goa.

The Wildlife Sanctuaries provide maximum protection to the wild animals within their precincts. Killing or shooting of animals and birds is completely banned and adequate facilities for drinking water and grazing are provided to the animals.

Common wild animals found in these sanctuaries are the leopard, wild boar, sambar, spotted deer, gaur, barking deer, hares, mouse deer, pangolins, slender loris, jungle cats, jackals, Malayan giant squirrels and civet cats along with a wide variety birds. Among reptiles, pythons and cobras are quite common. Jungle fowl are also found in the sanctuaries. The sanctuaries of Goa provide a wide range of habitats, providing shelter to a bewildering diversity of flora and fauna. There is a demand that some islands off Goa's coast be declared as marine sanctuaries; this would round off matters by ensuring that at least some portion of every natural habitat type in Goa is a protected area for wildlife.

Bhagwan Mahavir Wildlife Sanctuary — This is the oldest sanctuary in the state and was declared a game sanctuary on December 28, 1967 under section 18 of the Wild Animals and Wild Birds Protection Act, 1965. It was once again notified as a wildlife sanctuary on 27-12-82 under section 18 of the Wildlife Protection Act, 1972. Covering an area ranging from the highest ridges of the Western Ghats to the foothills, this sanctuary lies between the newly declared sanctuaries of Madei to the North and Netravali to the South. It is adjacent to the Dandeli Wildlife Sanctuary in Karnataka. After exclusion of some areas, the area of the sanctuary came down to 240 sq km. An area of 107 sq km was carved out as the 'Molem National Park' in 1978, reducing the area to 133 sq km.

Originally, the sanctuary was known as 'Molem Wildlife sanctuary'; it was renamed in 1984 in honour of the patron saint of the Jains, at the behest of the Jain community in Goa.

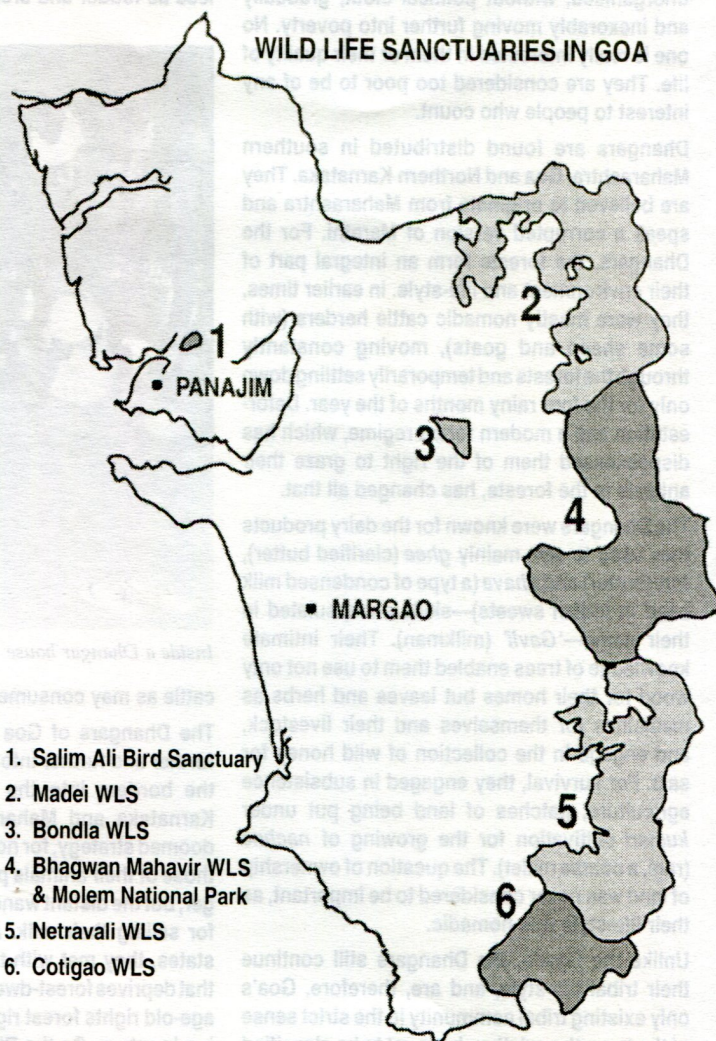
Forest calotes



Nirmal Kulkarni

In December 1972, the famous ornithologist, Salim Ali, visited the Mahavir Wildlife Sanctuary to prepare a report. He was extremely distressed at the state of the sanctuary after his investigations. He wrote in his survey report: 'As a result of official encouragement, and even incentives given to hunters during the Portuguese colonial administration, the forests have been effectively denuded of all wildlife, especially mammals, birds of prey and other large birds.'

'During a week's survey of the forested area at Molem—now hopefully established as a wildlife sanctuary—not a single large mammal was heard or seen—not



1. Salim Ali Bird Sanctuary
2. Madei WLS
3. Bondla WLS
4. Bhagwan Mahavir WLS & Molem National Park
5. Netravali WLS
6. Cotigao WLS

Wildlife Sanctuaries

Name of Protected Area	Year notified	Area in sq km
Bondla Wildlife Sanctuary, Ponda	1969	7.95
Bhagwan Mahavir Sanctuary, Sanguem	1967	133.00
Molem National Park, Sanguem	1978	107.00
Cotigao Wildlife Sanctuary, Canacona	1968	85.65
Dr. Salim Ali Bird Sanctuary, Tiswadi	1988	1.78
Madei Wildlife Sanctuary, Sattari	1999	208.48
Netravali Wildlife Sanctuary, Sanguem	1999	211.05

even any spoor—except one Giant Squirrel (*Ratufa*). The entire Molem, Caranzol and Neturim valleys adjoining Karnataka were completely dead, though densely covered with magnificent semi-evergreen and moist-deciduous forest. Wild animals such as gaur, sambar and pig are said occasionally to stray in from across the border, from Dandeli Wildlife Sanctuary of Karnataka, and with adequate protection, the Forest Department hopes to rehabilitate these and other species here. The only other wild mammal seen during the survey was a leopard cat (*Felis bengalensis*) that had been shot anonymously and propped up in the middle of a forest road in the Canacona area!

'Large areas of degraded forest at Valpoi and elsewhere have been clear felled by the Forest Department and planted with teak, rubber, eucalyptus, cocoa and cashew, and the impact of this intrusion, mostly exotic, on indigenous bird life will require careful monitoring.

'An excursion was made to the top of Vagheri in Valpoi taluka, just under 1000 m and said to be the highest hill in Goa. This was specially in order to establish whether or not the plant genus *Rubus* (brambles) and its symbiotic bird genus *Garrulax* (laughing thrush) also occur in Goa as both do in the Kerala ranges a couple of hundred metres above this elevation. While bracken (*Pteridium sp.*), another regular member of this plant-bird association, was plentiful near the top, there was no sign of *Rubus* or *Garrulax* although otherwise the biotope seemed eminently appropriate.'

It is to the credit of the Wildlife Wing of the Forest Department that the scenario changed dramatically in the decade that followed the Salim Ali Report. Census figures of 1981 and 1984 showed a remarkable resurgence of wildlife, which has improved further of late. After he visited the Mahavir Sanctuary in August 1981, Mr. K.T. Satarawala, former Lt. Governor of Goa, was sufficiently cheered by what he saw, to write to Dr. Salim Ali, 'We learnt that when you had visited the territory some years ago, you were disappointed that there was hardly any wildlife and no bison at all. You will be very glad to know that when we visited the Molem Sanctuary we found the place in an excellent and healthy condition. What is more, though it was a last minute decision at six in the evening and though, unfortunately, we were followed by a large number of noisy vehicles, including two diesel jeeps, we spotted a herd of 20 bison within minutes of entering the sanctuary. They were magnificent specimens and we could watch them for nearly fifteen minutes till the light faded. Everyone felt that you particularly would be glad to know about this improvement in the habitat as well as this very clear and delightful proof of it.'

The wildlife situation continues to improve. Occasionally, elephants and tigers from Karnataka are sighted in the sanctuary. The valley between Sonauli and Dudhsagar is a good habitat for King cobras, sambhar, boars and panthers. Gaurs have multiplied rapidly due to a series of conservation and anti-poaching measures.

The forest canopy cover is above 40% for the major part of the sanctuary with some open patches of grassland or permanent cultivation. Due to a wide range of altitudinal aspects, a wide variety of forest types occur here. *Eupatorium* weed, as also other weeds, have unfortunately invaded open areas and teak plantations causing



Harvey D'Souza

White-bellied sea eagle

havo to crop composition by suppressing natural regeneration.

Mining is the biggest threat facing the sanctuary. There are 33 working mining leases within 5 km radius of the sanctuary. Some areas originally included within the boundaries were later deleted to accommodate the mining interests. The Forest Department has suggested elimination of all existing mining concessions and termination of any existing dormant leases. There is constant disturbance as the National Highway and the rail line pass through the sanctuary.

Total human population within the sanctuary is 308, spread over 15 wados. A small area in the sanctuary is privately held. Traditional fairs are allowed to be held at Tambdi Surla for the local inhabitants. There is a complete moratorium on extraction of forest produce, though some NTFP is collected by local villagers for personal use.

The sanctuary is open throughout the year; entry is prohibited, however, between 5.30 pm - 8.00 am. The best season to visit is October-February. There is a Forest Rest House (for restricted occupancy only) and a Forest Resort with 23 rooms. There is a famous 14th century Kadamba period Lord Mahadeva temple ruin at Tambdi Surla. There are 4 watchtowers for observing wildlife. A safari is conducted by private safari operators.

Molem National Park — This was carved out of the Bhagwan Mahavir Wildlife Sanctuary (BMWLS) u/s 35 of the Wildlife Protection Act in 1978. This was done to give the best areas of the sanctuary the enhanced protection that results from the status of a National Park. The Park bisects the sanctuary into two portions.

Acquisition procedures commenced in 1982 and the process of settlement of rights is going on. Wherever possible, uninhabited private areas have been acquired. In case of inhabited areas, moves are on to rehabilitate the people outside the Park. The total population is 121.

Other information is the same as with respect to the Bhagwan Mahavir WLS, since the Park is essentially the erstwhile core zone of the sanctuary.

Cotigao Wildlife Sanctuary — This is located along the southeastern border of the state and is representative of the Western Ghats ecosystem. It was notified in 1968. The terrain is largely flat, becoming undulated as it meets the Western Ghats. The sanctuary is bounded by some of the highest hills in this region on the west, the Anshi National Park (Karnataka) to the Southeast and the

Netravali Sanctuary to the Northwest. The sanctuary initially covered 98.05 sq km, of which 12.4 sq km was deleted, bringing the area to 85.65 sq km.

There have been some sightings of tigers. There is particularly dense undergrowth in the sanctuary, which makes wildlife sightings particularly difficult. Bigger mammals are scattered in small pockets, and Gaurs are occasionally seen. The sanctuary has luxuriant bird life.

Large portions of the forest show a forest crown density above 40%. The sanctuary is noted for its lofty tree cover, some trees attaining heights upto 20 m. The undergrowth is mainly composed of the now familiar scourge, *Eupatorium*. The weed growth is particularly dense in the eucalyptus and teak plantations, a common problem with artificial monoculture plantations.

The whole issue of human settlement within the sanctuary as well as that of human interference by local villages has long been a contentious one. Around 6000 people reside in 20 villages, which have now been deleted from the sanctuary. But about 212 persons, mostly Kunbis, still reside within the sanctuary limits, spread over 8 *wados* belonging to Cotigao village panchayat. These persons are proposed to be located at Dabel in Poinguinim village panchayat. About Rs 51 lakhs is proposed to be spent on rehabilitation, which includes houses, agricultural land, schools, roads, power, water and irrigation facilities. Villagers claim that the irrigation facilities are not good and there is general skepticism regarding the scheme, which is not unjustified, considering that to date there has been no actual progress on the ground. The villagers are aware of the experience of the people displaced by the Selaulim dam and they are wary. The Forest Department claims, though, that there is no resistance to relocation. They say that there is active involvement of villagers in smuggling of liquor to Karnataka, which does not appear unlikely. There are disputes regarding rights for fuel wood and other forest produce. Villagers claim that there is still some privately owned agricultural land within the sanctuary, but the Forest Department claims that this is encroached forest land.

Whereas the attempt to create more salubrious conditions for wildlife is laudable, caution is in order. After

Endangered bats of the Barapeda caves

years of creating ecological refugees due to misconceived development projects, one does not want to see a new set of refugees emanating from last-ditch efforts by the elite to conserve the environment at the expense of others.

The sanctuary is open throughout the year, but entry is prohibited between 5.30 pm and 7.00 am. Entry permits can only be issued by the Chief Wildlife Warden. The best season for visiting is November to February. Facilities for accommodation are poor and animal sighting can be difficult, which is why the sanctuary does not attract many tourists. There are four watchtowers.

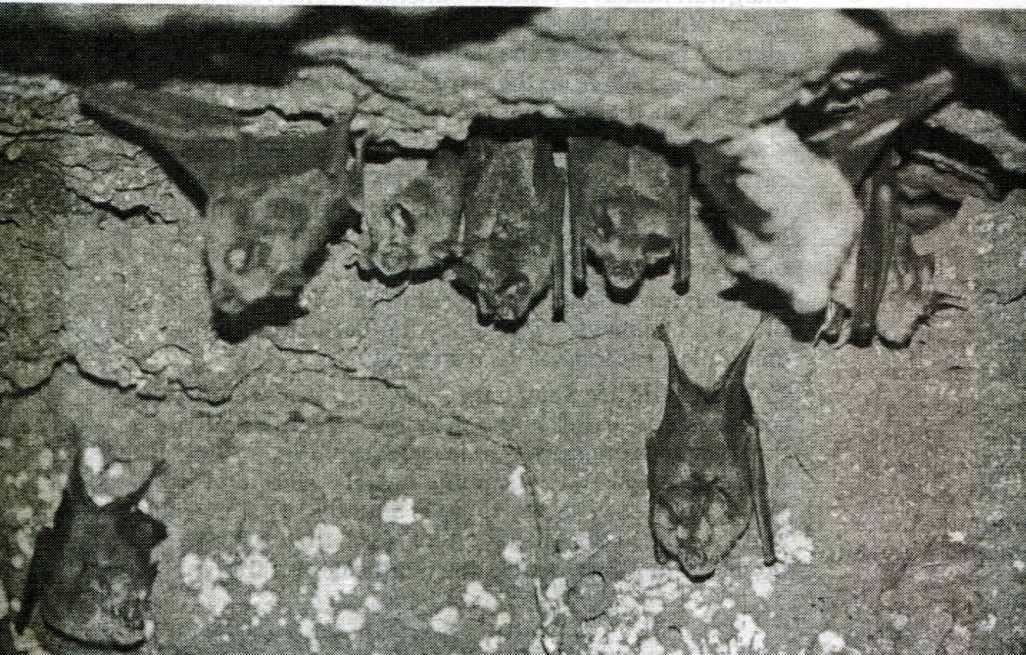
The Bondla Wildlife Sanctuary — It was declared as a game sanctuary in January 1968 under section 18 of the Wild Animals and Wild Birds Protection Act, 1965. It is located in a bowl shaped valley surrounded by hills. It is more akin to a natural park in that it is essentially maintained as a zoological park and botanical garden. It covers a small area of 7.95 sq km of which 15% is kept for the use of visitors. The sanctuary is connected to the Bhagwan Mahavir WLS by a forest corridor.

The sanctuary has a small zoo section which aims to house Goa's wildlife in natural surroundings and return these declining species to parts of their former range as conditions improve. Trapped, orphaned, wounded and otherwise seized wild animals are housed here and released into the wild after they regain their health—in that sense, the zoo is actually an animal orphanage. Visitors should bear this in mind. Following the visit of Maneka Gandhi, a Zoo Management Plan was drafted with suggestions for repairs and improvements.

In the wild, the most commonly sighted animals are sambar, chital and wild boar. The Wildlife Census of the FD in 1993 lists 12 species. There is a deer section, which is not totally enclosed, to allow the deer to come for food and then return to the forests. Forest types include Mixed Moist Deciduous with small patches of semi-evergreen forest. Bamboo is mostly found as undergrowth and regeneration is gregarious. The State Tree *Terminalia crenulata* (*matti*) and rosewood are common, with *xylicarpa* and *terminalia tomentosa* as dominant species.

There is no human presence in the sanctuary and human interference is not generally a problem, except in the corridor between Bondla and BMWLS, which has been considerably disturbed by mining activity.

This is the best-served sanctuary in terms of tourism facilities and has been developed with a view to accommodate both day and night visitors. It is open throughout the year, with the best season to visit being October to March. Entrance is prohibited between 6 pm to 8 am and the zoo, deer safari and garden are closed to visitors on Thursdays. The FD runs a daily bus-service between Tisk and Bondla. About 70,000 people visit the sanctuary annually and it succeeds in generating a decent amount of revenue on its own account. There is a Siddha deity, and villagers from adjoining areas attend the annual festival held here. There is a good Nature Interpretation Centre



Nirmal Kulkarni

with plenty of information available for visitors. Attached to the centre is a library consisting of several titles and journals on nature, environment and wildlife. Visitors can indulge in treetop viewing from platforms overlooking sites frequented by wild animals.

Dr. Salim Ali Bird Sanctuary, Chorao — This was notified as a sanctuary in 1988 under the Wildlife Protection Act, 1972, soon after the entire area had been declared a Reserve Forest under the Indian Forest Act, 1927. With an area of just 1.78 sq km, it is Goa's smallest sanctuary and the only one representing the state's vital mangrove areas. Originally marshland, the area was reclaimed for cultivation, salt farming and aquaculture. Frequent breaches and tidal influx led to its abandonment for cultivation. This allowed lush growth and establishment of mangroves, which led to its being declared a sanctuary. The area had initially been acquired by the Department of Agriculture and was later handed over to the FD. The mangroves are over 30 years old and many of the creeks are impenetrable due to dense growth.

The sanctuary functions as a protective habitat for typical mangrove fauna and birds. A large colony of flying foxes is resident here and one can occasionally sight crocodiles and turtles. Jackals take refuge on the bunds during high tide. A quarter of the bird species sighted here are migratory; some bird species like Pintails, Cotton Teals and Garganeys are not found since the area was reclaimed by mangroves and they may have shifted to other wetlands.

The vegetation is dominated by *Rhizophora*, *Sonneratia* and *Avicennia* species. Forest crown density is well above 40%. The mangroves of the sanctuary are classified as CRZ-I. The mangrove forests of Chorao have been recommended as one of the sub-centres for 'Mangrove Germplasm Preservation Centres' by the International Expert Committee under the ITTO/M.S. Swaminathan Foundation.

There is no human presence in the sanctuary, but there are 21 villages within a 5 km radius. There is some illegal cutting of firewood, and traditional fishing for fish, crabs and bivalves, using dugout canoes.

The sanctuary is open throughout the year, but the best season to visit is September-May. At a distance of just 6 km from Panjim, the sanctuary is accessible for birdwatching. It is not possible to walk around the sanctuary and approach is by motorboat. It is best to visit at high tide as the boats can then go through the creeks. There is one watchtower for birdwatching.

Report on Green Belts

GREEN BELTS AROUND BIG CITIES

Report of the Sub Committee for Maintaining Nature Reserves

by A.G. Untawale and others.

pp 6 plus maps for 6 cities (1990).

It was Dr. A.G. Untawale who first drew attention to the need for systematically protecting the existing nature reserves. Untawale defined nature reserves as 'the luxuriant growth of trees growing naturally and not by human management. Most of this type of vegetation is usually found along river or estuarine slopes.' Despite the fact that the Regional Plan has demarcated such nature reserves, they have started disap-

pearing. Dr. Untawale drew attention to the fact that while on the one hand, we are making efforts to increase our forest cover through expensive large-scale afforestation programmes, the existing nature reserves which are the lungs of our cities are being deforested for housing complexes.

Eventually the Wildlife Advisory Board set up a subcommittee for maintaining nature reserves/green belts around big cities. After visiting areas, the Committee submitted a report dated March 6, 1990. The report includes five maps which demarcate the nature reserves for Mapusa, Porvorim plateau, Panjim, Ponda, Mormugao and Margao. The Committee has made nine recommendations—the main one being that the authorities

Madei and Netravali Sanctuaries — The Goa Government declared two new sanctuaries in June 1999. With this, almost the entire Western Ghats strip in Goa has come under protection. This fulfils a long-cherished dream of environmentalists and is the culmination of years of efforts by the Forest Department and concerned individuals and organisations in Goa and elsewhere.

The two sanctuaries are the Madei Wildlife Sanctuary (208.48 sq km) and the Netravali Wildlife Sanctuary (211.05 sq km). Madei Wildlife Sanctuary provides a link between the reserved forests of Sawantwadi and the Bhagwan Mahavir Wildlife Sanctuary. The Netravali sanctuary bridges the corridor between the Bhagwan Mahavir Wildlife Sanctuary and the Cotigao Wildlife Sanctuary in South Goa. Thus, there is now a contiguous strip of protected forest stretching along the length of Goa, facilitating the movement of wildlife. It is hoped that many of the problems attending the reestablishment of wildlife in Goa will now be mitigated, as there is a large strip of protected area not only in Goa but also in the area alongside the border. Poaching is rife in the area and these new sanctuaries will provide animals with a wider range and facilitate their movement and migration with reduced risk of harm.

The ecological importance of these two sanctuaries cannot be understated. Madei sanctuary is in Sattari taluka, which, with 78% forest cover has the second highest area under forests after Sanguem. The hill ranges of this sanctuary serve as a corridor for animal movement from Karnataka into Maharashtra and vice versa. These forests are also part of the probable foraging area of the Wroughtons Free-Tailed Bat (*Otomops Broughtoni*) which live in the Barapeda caves of Khanapur taluka just 5 km away from the border. These bats are a critically endangered species. Another rare species of bat, the Theobald's Tomb Bat (*Tapazhous Theobaldi*) is found in the Krishnapur caves, 2.5 km from the Goa border. The Netravali Wildlife Sanctuary is in Sanguem taluka, which has the maximum forest cover among all talukas in Goa.

The protection of these forests is not an issue confined merely to wildlife. The freshwater supply of Goa emerges from these forests where the major Goan rivers originate. Goa is already suffering from a water crisis and deforestation in these catchment areas adds to the severity of the problem. Therefore, the creation of sanctuaries and the protection of their flora and fauna is, in a sense, protection of the whole of Goa.

should take all possible steps not only to protect the existing nature reserves but also to intensify afforestation of those reserves which have deteriorated. It also recommended that no development be allowed on hill slopes with more than 15 per cent gradient. And, that in any event, no quarrying or mining should be allowed in such areas. Untawale had even suggested that the government declare these areas as protected and that they should be in the hands of a single authority. As of now, the Government and the planning authorities, including the Town & Country Planning Board, continue to allow the conversion of plots in the nature reserve areas and green belts for development, despite the report of the Subcommittee and the advice of learned scientists like Dr. A.G. Untawale.

Madei Wildlife Sanctuary

EXTRACTS FROM THE BACKGROUND NOTE DATED JUNE 1999 THAT LED TO THE NOTIFICATION ON THE MADEI WILD LIFE SANCTUARY

1. The Western Ghats are one of the richest reservoirs of biodiversity in the world. The sections that lie within Goa (the Sahyadris), and which dominate its ecosystem readily reflects this bewildering complexity in plant, animal and bird life.

2. But the Western Ghats, along with most parts of the country, have sustained extreme environmental degradation. Being ecologically fragile, the damage has often been irreparable and disproportionately severe. The causative factors for degradation range widely from destruction of forests for commercial tree plantations, clearance of large tracts for cultivation, excessive cattle grazing and unsustainable cultivation practices leading to a total loss of the production potential of the land. More recently, extensive road construction (undermining the stability of the hill slopes), industrial mining, urbanisation, population pressure and excessive demand for the limited basic resources such as water, fuel, etc. are also leading to the total destruction of this hill range.

BIOLOGICAL WEALTH:

3. A considerable part of the residual endemic flora and fauna of the peninsular is also concentrated here. The complex topography, high rainfall, relative inaccessibility of the tract and biogeographic isolation, have helped the Western Ghats retain their biological diversity to some extent—at least until very recently.

FLORISTIC DIVERSITY:

4. Floristically, the Western Ghats is one of the richest areas in the country, harbouring no less than 3500 species of flowering plants in the country. There is an equal, if not richer, proportion of lower plants.

The Western Ghats has 84 species and two varieties of endemic orchids belonging to 30 genera (three genera are endemic). Of the known orchids of Indian peninsula, 37 percent are endemic to the Western Ghats region. Fifteen species of orchids are endangered in the Western Ghats.

The State is bestowed with a relatively rich floristic diversity. Vartak (1966) in his *Flora of Gomantak* has recorded a total of 1512 species of plants (including 49 ferns) over an area of 3282 sq km.

WHAT INTERNATIONAL ORGANISATIONS SAY:

5. Wildlife International, Cambridge, England has officially classified this area as one of the ENDEMIC BIRD AREAS (EBA) of the world. This has been published in the 'Global Directory of Endemic Bird Areas' (1996) and 'Putting Biodiversity of the Map' (1992). There are 217 EBAs in the world which represent priority areas for global biodiversity conservation. Our concerned area is part of an EBA.

6. The National Geographic Society, Washington D.C., in its publication 'Diversity of Life', February 1999 has described this area as follows—'a large number of endemic species, some traced back to forebears on the ancient supercontinent of Gondwana have evolved on India's long isolated western mountain ranges.' 16 bird species and at least 1500 plant species live only here. Pressure from expanding human population, logging and farming is intense.

The National Geographic Society has classified these forests as 'Tropical Moist Broadleaf (includes rainforests)' and assigned them classification number 13 which is same allocated to the equatorial rainforests of Borneo in Indonesia, Papua New Guinea, New Caledonia, Madagascar Congo Basin (Central Africa), Amazon (Brazil), Chile, Ecuador, Columbia, Guatemala, Honduras, Nicaragua, Costa Rica. The forests of Sattari are of equal importance to the world as the forests of the countries mentioned above. All these forests have been categorised as tropical rainforests (classification number 13) 'Diversity of Life'—National Geographic Feb. 1999.

7. Page 65 of Time Magazine (14 Dec. 1998 issue)—U.S. edition states that 2180 plant species are unique to the biodiversity hotspot of the western ghats. Conservation International—Washington DC has classified this area as a biodiversity hotspot of the world—source Dr. Norman Myers of Conservation International, Washington DC.

8. The book 'A Framework For Identifying High Priority Areas and Actions for the Conservation of Tigers in the Wild' by WWF International, U.S. Fish And Wild Life Services and Wild Life Conservation Society—New York lists this area as a Level 1 tiger conservation unit (TCU) with 55 points. This area ranks second in India after Sunderbans (65 points) and eighth in the world as the finest tiger habitats in the entire world. This study was completed in 1997. The International scientists who have authored this book state on pg.18 'the level 1 TCUs are recommended as highest priority areas and should be the target of international and regional conservation efforts.' We have greatest confidence in our ability to designate TCUs as level 1 and level 2. Page 8/13 — states that the root cause of the decline of the tigers across their range are habitat fragmentation, degradation and eventual loss of habitat and intensive poaching of tigers and their prey.

9. Barapeda caves in Khanapur taluka just 5 km away from Goa border houses the Wroughtons Free Tailed Bat (*Otomops Wroughtoni*)—the only place in the world where this bat resides. Foraging range of the bats is unknown. Dr. Paul Bates of Harrison Zoological Museum, Scotland was the last international scientists to visit the caves in 1992. The bats have been classified as critically endangered. The forests of Sattari can be the foraging area of these bats.

10. Krishnapur caves houses the Theobald's Tomb Bat (*Taphozous theobaldi*) which is present in only two other places in India. Foraging range of the bats—unknown at the present moment. Habitats, food—unknown. Endangered species.

Page 49 of BNHS journal vol.5 (1) states that 'the biology of *T. theobaldi* in India remains practically unknown.' Krishnapur caves are just 2.5 km away from the Goa border. The forests of Sattari is the foraging area of these bats.

ABOUT SATTARI TALUKA:

11. Sattari Taluka has 78% of forest cover of North Goa and after Sanguem, it is the only Taluka having largest area under forest. Sonsogad is the tallest mountain in Goa and the second highest is 'Catlanchi Mauli'. The third highest is Vagheri (abode of the tigers). All three mountains fall in Sattari taluka. These ranges act as a corridor for animal movement from Karnataka into Maharashtra and vice-versa.

Sacred groves—a traditional forest conservation practice has not attracted much attention of scientists and NGOs in Goa. There are more than 50 sacred groves in Sattari taluka. Most of the sacred groves are located in the proposed protected area. The sacred grove 'Nirankarachi Rai' near Bhomber on the way to Kodal is dominated by a unique plant species *Myristica malabarica*. These are tall trees with mangrove type roots. It is endangered and endemic to the area. The original area of 6 hectares has been reduced to 0.25 hectares due to tremendous pressure of population and agriculture.

The above mentioned area forms the prime catchment area of the major tributaries of the Madei river. This is an extremely important source of fresh water for the people of North Goa. The legal protection of the green cover of the above mentioned area will facilitate and suffice the increasing demand of fresh water by the population of North Goa.

The forests of Sattari taluka ranks second in India and eighth in the world as the finest tiger habitats in the entire world. These forests are the only corridors for Tigers to move from Karnataka into the Reserve forests of Sawantwadi in Maharashtra.

12. The present area proposed for declaration as a sanctuary under Section 18 of the Wild Life (Protection) Act, 1972 is approximately 208.48 sq km covering two forest ranges, viz. Valpoi and Keri. The area proposed for, has already been declared and notified under Sec. 4 and 20 of the Indian Forest Act, 1927, and as per land belongs to the Goa Forest Department.

13. This area has a vast biological wealth, diversity as well as endemism. Blandford lists 48 mammals genera, 275 genera of birds, 60 genera of reptiles and many other creatures yet to be recorded from this pristine forest area. A list of

(Notification continued on following page ...)

Netravali Wildlife Sanctuary

EXTRACTS FROM THE BACKGROUND NOTE OF JUNE 1999 THAT LED TO THE NOTIFICATION ON THE NETRAVALI WILD LIFE SANCTUARY ABOUT SANGUEM TALUKA:

9. Sanguem has the maximum forest cover among all the talukas in Goa. It forms a significant constituent of the Western Ghats which run all along the Eastern border of Goa. The Taluka is gifted with high range mountains which have socio-cultural and religious importance to the local habitants of the forest. One of the most traditional and cultural practice of conservation in these areas are of protecting the forests around a local deity. A conservative estimate of total number of sacred groves is more than 60. Some of the examples are listed below:

—At Neturlim there is a place called Budbudi Tale (the pond which creates bubbles). It is believed that the bubbles rise to the surface when one claps.

—The tribals of this area are called the Velips and they worship a deity called the 'Paik dev'. It is an important deity of the forest dwellers of Sanguem. It represents a sword-wielding male god riding a horse. Small statues made of clay are worshipped at the centre of sacred groves.

—At Salgini (Verlem) there is a Mahadeva temple and a sacred grove called Mahadevachi Rai. This grove is surrounded by three magnificent mountains which go by the names of Endapali Dongor, Goddi Dongor and Madiraichi God.

—The Nasa Dongor (the great hill) falls in this area and runs across the forest of Mangal and Verlem.

—At Neturlim there is a mountain called Mhatara Dongor (the old mountain) and the Chand Surya Dongor (the mountain of the moon and the sun)

Madei Wildlife Sanctuary notification contd.

animals etc. found in the area may please be seen at page 8/c.

14. In view of the above, it is important that the area admeasuring 208.48 sq km in the coordinates, viz. Northern extremity—15° 40' 52" East; Southern extremity—74° 17' 03" East; Southern extremity—15° 27' 27" North; Western extremity—74° 5' East, is declared as Madei Wild Life Sanctuary so that the biodiversity is preserved for posterity. A draft notification is accordingly placed at Page 11/C along with map of the area at page A & B.

Submitted for favour of consideration and approval.

(Richard D'Souza)

Conservator of Forests & Ex-Officio Addl. Secy.

No.2-333-99-10/A-Part/778

Date: 18/5/1999

near village Bandiwade touching Sigonem.

—There is an ancient temple called Mahadevachi temple on Sidha Dongor.

—At Bati there is a place called Vagpedi (the cave of the Tiger). Even today the villagers say that Tigers visit this place. There is a sacred grove called Goelho Rai at this place. At Kumari (Bati Panchayat), there is a sacred grove called Kalas Dev spread over ten acres of land and consists of two temples. At the same Panchayat, a water hole called Kajre Tol is visited by Tigers according to the villagers.

—Tiger sightings have been reported from Vichundre and at Ghatto Dongar at Pata-Netroli where a couple of cattle were killed at the same time a year ago.

This range is an extremely important source of fresh water for the people of South Goa. The legal protection of the green cover of the above mentioned area will facilitate and suffice the increasing demand of fresh water by the population of South Goa.

The forests of Sanguem Taluka ranks second in India and eighth in the world as the finest tiger habitat in the entire world. These forests are the only corridors for tigers to move from Karnataka into Goa.

THE URGENT NEED FOR PROTECTION OF WESTERN GHAT SECTOR OF SANGUEM

10. The forests of Sanguem lying on the Western Ghats is part of the largest patch of continuous forest remaining in the country along with the forests of the North East. The problems in the North East further enhances the need for protection of these forests. These forests have a large number of endemic species, they are ancient and are one of the last remaining forests from the Gondwana land mass.

11. The Zoological Survey of India (ZSI) has made a survey of the Western Ghats and established that the rate of deforestation in the ghats varies between 60 and 110 sq km per year. It has warned that if immediate conservation measures are not initiated the Western Ghats will be wiped out in the next five decades. It has also been observed that the wiping out of the tropical forests would have an important consequence on the life on Earth, the magnitude of these consequences cannot be predicted with precision. In 1992, at the Earth Summit at Rio, the United Nations classified the Western Ghats among the twelve ecological hot spots of the world. They have one of the highest concentration of flora and fauna—nearly 50 variety of fauna and 200 plant species per hectare. Only three other regions in the world—Latin America, Africa and Peninsular Malaysia can boast of similar kind of rain forests. These forests have been gravely threatened by illegal human encroachment.

12. It is also learnt that some forest areas which are proposed to be included in the above sanctu-

ary have been illegally encroached upon by people even though the ownership of these forests is with the Goa Forest Department. These encroachers cut the original primary natural forest and plant cash cultivations like cashew. By declaring a sanctuary, the Government can act swiftly and legally against these encroachers. When these areas are brought under a sanctuary, the action against the encroachers will be speedier and easier from an administrative point of view, because of sterner punishments under Wildlife (Protection) Act, 1972 as compared to Indian Forest Act, 1927. If this action is not taken now, illegal encroachments will devastate the natural forests of the area which are extremely important not only for fresh water security of Goa, but also to protect its rich bio-diversity.

13. It is also pertinent to note that in neighbouring Karnataka State, effective steps have been taken in protecting its forests legally along the borders of Goa. They already have the Dandeli Wildlife Sanctuary measuring 475 sq km in the Haliyal and Joida Talukas (District Uttara Kannada) which is the southeast of Goa and contiguous to the forests of Eastern Goa. Furthermore, they have now proposed a third wildlife sanctuary spread across talukas Khanapur and Joida and Haliyal measuring around 609 sq km and covering the sensitive biodiversity areas like Madei valley, Castle Rock, Anmod, the Barapedi and Krishnapur caves and linking up with Dandeli and Anshi sanctuaries for which notification is being issued by the end of this month.

18. This area has a vast wealth diversity as well as endemism. Blandford lists 48 general mammals, 278 genera of birds, 60 genera of reptiles and many other creatures yet to be recorded from this pristine forest area.

19. In view of the above, it is important that the area admeasuring 211.05 sq km in the coordinates, viz. Northern extremity—15° 16' 17" North; Eastern extremity—74° 18' 45" East; Southern extremity—14° 59' 50" North; Western extremity—74° 09' 39" East, is declared as Netravali Wild Life Sanctuary so that the biodiversity is preserved for posterity.

Submitted for favour of consideration and approval.

(Richard D'Souza)

Conservator of Forests & Ex-Officio Addl. Secy.

No.2-335-99-FD/934. Date: 31/5/1999

Governor:

I am glad that after this notification the whole rain forest of the Western Ghat in Goa has been made into a protected area.

Lt Governor Jacob

1/6/99

DISPUTE OVER THE NEW WILDLIFE SANCTUARIES

It was hardly unexpected that the declaration of these two new sanctuaries would ruffle the feathers of entrenched political and commercial interests. Soon after the announcement, protests began to be made. There was an organised campaign to get the local people to start a movement against the declaration of these sanctuaries. This was done by spreading misinformation and also using the hoary cliché of 'environment versus development'. Goan politicians were clearly miffed that this measure had been taken during President's Rule; in fact, the short-lived Faleiro government spent much of its initial time and energy trying to reverse much of the good that was done during this period. The Parliamentary elections which took place in September 1999 only added fuel to the fire with political parties finding a ready made issue to try and win votes; no matter if certain facts had to be distorted in the process. The BJP promised to exclude the areas of habitation from the sanctuary while the Congress went to the extent of promising to denotify the sanctuaries with the ex-CM (and current speaker) threatening to resign his assembly seat if this were not done! There have been allegations of unseemly haste, loss of rights of the local people, halting of developmental activity in the area etc. Behind much of this hullabaloo, the hand of the mining lobby is clearly discernible.

Most of the allegations can easily be shown to be false and motivated. Much of the land included in the sanctuaries is already reserved forest and the claims there have already been disposed of—in fact, the process of constituting them as reserved forests took place during governments of the parties which are opposing the notification now. In the remainder of the area, there are no outstanding disputes in Madei and only two in Netravali. Some of the forest land has been encroached for growing cashew. The genuine cases of farmers who have been cultivating the land for some time and have no other means of livelihood will be treated favourably once they file their claims. The Forest Department has been careful to avoid all areas of habitation when deciding the boundaries of the sanctuary. Mining will not be possible in these areas which is a positive development, and difficulties in transportation of mining ore etc. are a small price to pay

Unnamed tributary of the Madei as it enters Goa



for the manifold benefits which will accrue from these sanctuaries.

New Committee to Denotify the New Sanctuaries — On 4.9.2000, the government set up the Hemant Karapurkar Committee to reconsider the notifications declaring the limits of the Madei and Netravali Wildlife Sanctuaries. This was not a Committee of Experts, but a mixed bag of persons drawn at random for the purpose of justifying the proposed de-notifications, if possible.

The Karapurkar Committee issued advertisements and other press notes and visited some of the areas within the sanctuaries. It claimed that it met several villagers and heard their views. It finally submitted a brief report on 30.3.2001 in which it recommended that almost half the area be denotified, specifically to exclude human settlements. However, the Committee rejected the demand to cancel the notifications in their entirety, saying the sanctuaries were essential.

When the report was placed before the Goa government, the Forest Department referred the matter to the law department, which effectively spiked the proposals made in the report on the ground that as there was a blanket ban on such denotifications by the Supreme Court, it was absolutely necessary to approach the Supreme Court in the matter and seek its prior sanction.

Forests for whom?—There is no doubt that the creation of two new sanctuaries in Goa is a big step forward in terms of environment protection and conservation. But it would be wise to sound a cautionary note at this point.

As mentioned earlier, there have been numerous voices raised against the creation of these sanctuaries. Many of them could be dismissed as being raised by elite groups—particularly mining barons—whose economic interests may be affected. They have raised a number of false issues and created controversies where there was no real issue. But why is it that the common people of the region have joined in the protests? It would be naïve to imagine that people could so easily be misguided by politicians and industrialists.

The apprehensions of local people in the sanctuary areas may not be entirely unfounded. The Forest Department has never been noted for its sensitivity to the needs of local people, particularly the poor. The experience in Cotigao is fresh in the minds of the people. Also, the boundaries of the sanctuary have been defined in large-scale maps of 1:100000 whereas the village survey maps

Netravali Wildlife Sanctuary

1. Total W.L.S. area as notified in 1999	218.09 sq km
2. Area declared u/s 26A of Wild Life Act, 1972	56.970 sq km
3. Area declared u/s 18 of Wild Life Act, 1972	161.12 sq km
4. Area u/s 18 per exclusion as per Karapurkar Committee	088.98 sq km
5. Area u/s 18 per exclusion as per Cabinet decision in July 2000	161.12 sq km
6. Area of Wild Life Sanctuary if Karapurkar recommendation were accepted	129.11 sq km
7. Area of Wild Life Sanctuary if Cabinet recommendation were accepted	56.97 sq km
8. Number of families involved	400
9. Mining leases affected	33
i. Rejected already	1
ii. Working	11
iii. Not Working	21
10. Talukas (villages) affected	Sanguem (15) Quepem (1)

Madei Wildlife Sanctuary

1. Total W.L.S. area as notified in 1999
2. Area declared u/s 26A of Wild Life Act, 1972
3. Area declared u/s 18 of Wild Life Act, 1972
4. Area u/s 18 per exclusion as per Karapurkar Committee
5. Area u/s 18 per exclusion as per Cabinet decision in July 2000
6. Area of Wild Life Sanctuary if Karapurkar recommendation were accepted
7. Area of Wild Life Sanctuary if Cabinet recommendation were accepted
8. Number of families involved
9. Mining leases affected
 - i. Rejected already
 - ii. Working
 - iii. Not Working
10. Talukas (villages) affected

are on the scale of 1:10000. This makes it difficult for the Department to say authoritatively and convincingly that this or that patch of land has been included in or excluded from the sanctuary limits.

The simple fact of the matter is that there is a long history behind the mistrust of people in such matters.

All over rural India, and particularly in areas where there are sizeable forests left, the most hated arm of the Indian Government is the Forest Department. The reasons for this lie in the process whereby forests were taken over by the state and the elites and the common people were left deprived of a resource on which their very livelihood depends.

For centuries, forests have been sustainably managed by the very people who are now excluded from them. The Forest Department itself was a creation of the colonial British (in the case of Goa, Portuguese) government. The purpose for which it was set up was quite clearly commercial—to provide wood for British ships and railway expansion and to generate maximum revenue. In this scheme of things, man was explicitly identified as one of the enemies of the forests.

The forests had earlier been common lands, cooperatively and sustainably managed by local communities. Now, the ownership of the forests was vested in the Forest Department, effectively making it India's biggest landlord. Through a series of laws and regulations, the people's rights, when they were recognised at all, became favours granted at the whim and mercy of the government. The situation became so ridiculous that the noted anthropologist and crusader for tribal rights, Verrier Elwin quotes a Forest Officer as having told him, 'Our laws are of such a kind that every villager breaks one forest law every day of his life.'

The tragic results of converting people into criminals in the very forests they have inhabited and nurtured for centuries are visible in the impoverished and alienated lives of many of India's tribal and forest-dwelling communities. The *dhangars* (pastoralists) of Goa (see box on page 45) are a case in point.

Ruled by a decadent Portuguese empire lacking the sharply honed commercial skills of the British, the forests in Goa were largely left alone, which was the best of all possible things that could have been done to them.

But, after liberation, Goa and its forests inherited the Indian Forest Department. And this Forest Department

Total area of New Sanctuaries

211.13 sq km	<i>After notification in June 1999:</i>	
44.270 sq km		
166.86 sq km	Madei	218.09
81.79 sq km	Netravali	211.13
166.86 sq km	Total	429.22
129.34 sq km	<i>After Cabinet decision in July 2001:</i>	
44.27 sq km	Total	429.22
1826	Area excluded	327.98
7	Total Sanctuary area today	101.24
3	<i>The Cabinet decision is subject to the approval of the Supreme Court. Till this comes, status quo is being maintained.</i>	
—		
4		
Sattari (31)		

was, tragically enough, little different from what it had been under the British. The so-called 'scientific' approach to forestry espoused by it led to the cutting of large areas of pristine natural forest and their replacement by monoculture plantations of exotic species like eucalyptus, which were of little use to local people. Instead of serving the foreign masters, the Forest Department now served the interests of India's indigenous elites, a group which was as divorced from the realities and needs of the Indian people as the colonialists had ever been. Carrying on with its legacy, it continued to stigmatise humbler humans as 'encroachers', while working hand in glove with the ruling classes to plunder this resource mercilessly.

And plundered it was, into a state of almost irreversible decline. Until the advent of the Forest Conservation Act in 1980.

But let us not unduly eulogise the environmentalists either. Many of the strands of the pro-environment discourse suffer from the same distaste for the common people as earlier approaches. They continue to identify common people as the cause of the degradation of India's forests. Western development experts are more concerned with our forests as carbon sinks for their emissions. A section of elite environmentalism—quite influential in India—is glad to soothe its collective conscience by marking out protected areas (far from their homes) for wildlife from which ordinary humans, unless they come as well-heeled eco-tourists, are excluded. In this process, they conveniently forget that it is the consumer needs of their class, rather than misuse by local people, that has brought our forests and wildlife to this pass.

Even the few community forest rights that remain are in danger of being curtailed or extinguished when sanctuaries are declared. Recognising the danger of such an approach, the Indian Wildlife (Protection) Act permits continuation of those human activities considered as not being in conflict with wildlife management objectives.

Therefore, while restating that the new sanctuaries are a step in the right direction, let us hope that the Forest Department officials will sensitively explain the pros and cons of these sanctuaries to the local people and that they will take the people along with them.

THE SAWANT COMMITTEE REPORT ON GOA'S PRIVATE FORESTS

In December 1996, in a wide-ranging order, the Supreme Court asked all the states of India to set up expert committees to examine the status of forests in their respective areas and to file reports. The terms of reference:

- Identify areas which are 'forests' irrespective of whether they are so notified, recognised or classified under any law, and irrespective of the ownership of the land of such forest;
- Identify areas which were earlier forests but stand degraded, denuded or cleared; and
- Identify areas covered by plantation trees belonging to Government and those belonging to private persons.

Following these orders, the Goa Government constituted an expert committee in early 1997 under the chairmanship of Mr. S.M. Sawant, which came to be known as the 'Sawant Committee'. Apart from senior forest officials, the committee also had members like Dr. A.G. Untawale of the NIO and Mr. Jagdish Wagh who are known for their work on environmental issues. The Committee utilised the services of officers of the Forest Department and visited numerous areas during the course of its work. It submitted two interim reports to the Supreme Court in 1997 and a final report to the Goa government in December 1999.

The work of this committee represented an important step forward in the history of the protection of Goa's green cover, as it was for the first time that a systematic study of the extent of forest area, irrespective of the ownership status of the land on which the forest exists, was being carried out.

The Committee's final report, however, is not a complete statement of the extent of forests in the State of Goa. The Committee identified about 1224 sq km of Government forest lands relying upon departmental data but its identification of forest on lands other than government lands was a meagre 48.65 sq km. This when the Forest Department itself has estimated the total such area to be in the region of 200 sq km. The Committee also reported

that the total amount of government forest land diverted for the 'purpose of mining and other developmental works' is about 13.08 sq km. On the issue of plantations, the Committee has identified 260.64 sq km of area under plantation on Government forest lands, 48.35 sq km on land belonging to Comunidades and 791.22 sq km on lands other than Government forest land.

The Committee itself seems to have realised that some of these lacunae exist and the necessary disclaimers are made in the 'Limitations and Recommendations' section of the report. The Committee has therefore recommended that a survey be undertaken to identify precise limits of existing forests on land other than Government forest lands. The survey will cost Rs 27.70 lakhs. It has recommended that the necessary mutation of land records in Form I & XIV of revenue records be done in respect of all such lands to reflect their classification as forest. Finally, accepting that there has probably been some underestimation, the Committee has specifically said that the applicability of the Forest Conservation Act on lands other than those identified by the Committee shall not be limited by the report and that the Government may notify any additional lands identified in future as 'forests' as per the order of the Supreme Court.

Normally, the Sawant Committee report would have to be routed by the State Government directly to the Supreme Court. However, sufficient pressures were brought to bear on the Forest Minister, D.G. Narvekar, to scuttle the report. Accordingly, on 24.1.2000 the Forest Minister recorded a 2 page note in the file which attempted to set out several lacunae—mostly specious—in the final report of the Committee. The note stated that several villages did not find mention and that the criteria adopted by the Committee were without taking government into confidence 'which is either a deliberate attempt or an attempt to keep the government in the dark.'

Accordingly, the Forest Minister decided not to accept the Final Report. He set up a new committee to go into all these aspects. The new committee was headed by Hemant Karapurkar. Interestingly, the new committee was not notified in the gazette and neither were its terms of reference as specified in the 12.12.96 Supreme Court order. However, in advertisements issued in the newspapers it claimed that the work it was doing of identifying forests was in line with the Supreme Court's order. More of the Committee's work however, was devoted to visiting the sites already identified as forests by the erstwhile Sawant Committee and having them declassified, though the ostensible purpose of setting up the Karapurkar was to identify more forests.

The Goa Foundation therefore filed a petition under Article 32 of the Constitution, challenging the decision of the government to reject the Sawant Committee report. It also challenged the setting up of the Karapurkar Committee. When the matter came up before the Supreme Court, it restrained the Goa government from interfering with the Sawant Committee report. Whether the Supreme Court will eventually allow such an open and flagrant undermining of its orders is to be seen but at the time of writing even the BJP led Parrikar Government was supporting the Karapurkar Committee's work despite the fact that the Committee was set up with crooked motives and was never sanctioned by the Supreme Court.

Claude Alvares

Pilerne forest saved from the axe by a Goa Foundation writ petition





Traditional way of packing and storing rice

Goa is loved for its mangoes: there are literally dozens of varieties, some wild, many grafts. Several are named after individuals: Alphonso, Horatio, and so on. At one time, before cashews also began to crowd the land, there must have been mango trees in every nook and corner of the state. Proof of this is the number of Goan villages named after the mango itself:

Amone (Bicholim), Ameshi (Pale), Amurli (Saton-Pale), Ambegal (Pale), Ambirna (Succor), Amarkhane (Savoiverem, Keri), Ambegal (Panchwadi), Amthane (Sal), Amthane (Pirna), Ambevhal (Succor), Ambaral (Taleigao), Ambegal (Ponda), Ambekhane (Vere), Ambeli (Sattari), Ambede (Sattari).

Rajendra Kerkar has found out several villages that are named after other common fruits and flowering trees. Here is a brief list:

Jackfruit: Pansuli (Sattari), Ponshe (Sattari), Ponshe (Khandepar), Phanaswadi (Navelim – Bicholim)

Kokum: Bhironda (Sattari), Bhirone (Pernem).

Bimbal: Bimbal (Sattari)

Pendral: Pendral (Sattari)

Nano: Nanoda (Sattari), Nanoda (Bicholim), Naneli (Sattari)

Mhavling: Mhavalinge (Bicholim)

Karmal: Brahma-Karmali (Sattari), Karmali - Khurd (Sattari), Karmali (Tiswadi)

Banana: Kelawade (Sattari), Kel (Pirna - Bardez).

Sugarcane: Usgao (Bicholim).

Banyan: Wadawal (Bicholim), Oshel or Oxel (Siolim).

Tamarind: Chinchole (Panjim), Chinchmala (Parye-Sattari).

Tulsi: Tulshimala (Sattari), Tulaskond (Sattari).

Ravan: Ravan (Sattari).

Now, let's examine the number of Goan villages named after animals, again courtesy Kerkar. Goa is tiger (*vagh*) country and this is reflected in the names of the following villages:

Vagus (Usgao), Vagal (Keri-Ponda), Vagali (Kamurli), Vaghdongari (Shiroda), Vagapeth (Satore, Shiroda), Vagus (Pale), Vaghurme (Savoiverem), Vaghkolomb (Harmal), Vaghator (Caisua), Vaghapeth (Bori).

And now here comes the rest of the zoo!

Monkey: Makadsheno (Vazari), Makadsai (Borim).

Swan: Hansapur.

Nag: Nagzar (Pernem), Nagoa (Bardez), Nagali (Caranzalem), Nagve (Valpoi), Nageshi (Ponda).

Peacock: Morle (Sattari), Morashi (Keri), Mordongar (Vadawal - Bicholim).

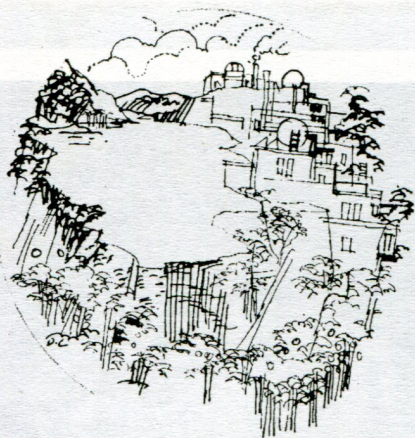
So what will you say about a place that has village names like these? That it had a remarkable, living relationship with its animals and trees? That much is obvious. But is that all?

The Goa Foundation commissioned several reports from experts (academic and non-academic) on the ways in which people, particularly those living in the rural areas of Sattari, Sanguem and Quepem, interact with nature, worship it and use it for their livelihood. We came out with quite a few surprises.

People from these remote areas have the ability to take care of themselves with very little assistance from the modern economy. The latter we know is now almost wholly plastic in more ways than one. Town people are used to a whole range of industrial goods which they purchase easily from shops which bring these goods all the way from bigger cities like Mumbai or Bangalore. But this is not the case with people outside the towns and living in the bosom of nature, so to speak.

Take rope, twine or string, for example. We are accustomed to purchasing it readymade from the market. However, in villages close to the forest, people use a wide variety of plants and creepers to fashion 'instant' rope. They use such rope with great skill and deftness, and create remarkable objects and devices with it.

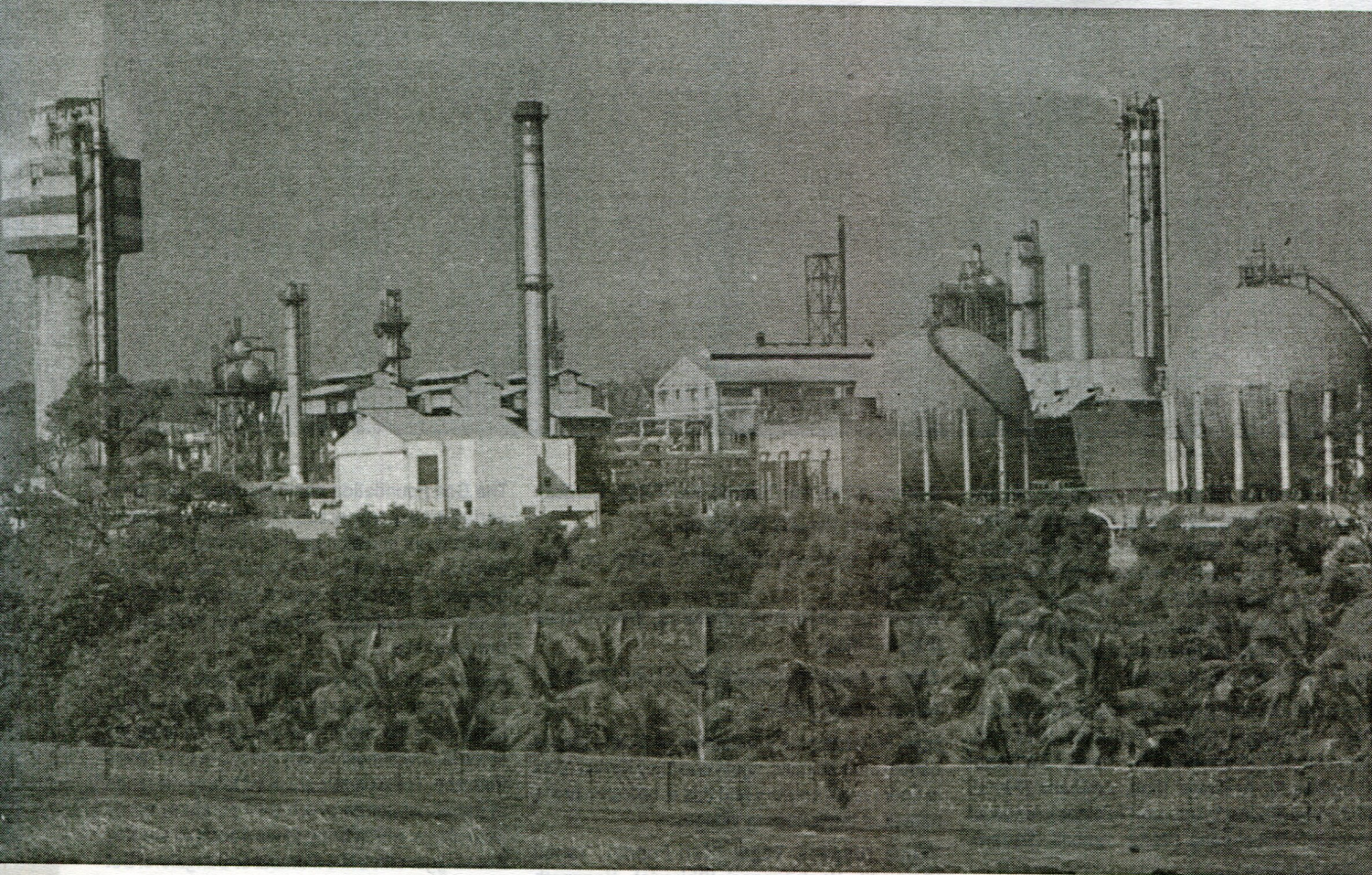
The most impressive of the uses of nature's biodegradable products is the manner in which straw is used to package rice. City people see rice in plastic sacks. But in the village you can still get rice packed in a tight ball of paddy straw and paddy straw rope. Can anyone get more self-reliant than this?



Some people come to Goa and never see anything beyond the coastal city of Panjim or the beaches. They can be therefore forgiven for believing that Goa is Latin and Catholic and Western and nothing else.

Thousands of people live in what is commonly called the State's midland region, an area dominated by plateaus and even a few valleys and floodplains.

The region is the seat of Goa's majority Hindu culture which finds expression in several distinctive cultural forms, among the most well-known of which are the temples. Others include the unique *kulagar* agriculture, the no-fish



Zuari Industries Limited's Fertiliser unit at Sancoale which has polluted the air and water since its inception

Plateau Region

life-style of some of its communities and the ancient irrigation tanks—some still in use—on which it was once based. In the holy name of development, the rulers have made a variety of attempts to cram most of the plateau lands with a diversity of polluting factories including the ill-fated, now defunct Nylon 6,6 of Du Pont.

So this, in effect, is Goa's industrial zone, home also to huge polluting monsters like Zuari Industries Limited, and smaller menaces like Penguin Alcohols and Meta Strips. And a litter of industrial estates, approved without adequate water supplies, so that in desperation, they steal it from innocent villagers. Giving them the headache of pollution in exchange.

GENERAL FEATURES

The midland portion of Goa, being the intermediate area between the high Western Ghats and the coastal plains at sea level, is composed largely of plateaus with heights between 30 and 100 metres. The plateaus are a characteristic feature of Goa; the tops are fairly level but in many areas deeply notched by gullies. The plateau rims are noticeably sharp. A scarp slope usually marks the quick transition to the alluvial plain below.

Wherever the plateaus meet the coastline they end in headlands: in the north of Goa, the Aguada, the Cabo and Mormugao heights are good examples of this.

Not unnaturally, the historic forts of Goa's defence were all strategically situated on such headlands. Today they lie largely in ruins.

Vegetation — The vegetation topping the plateaus and their laterite cover is comprised mainly of various species of scrub and rough grass due to the very poor shallow soil. There is more intense vegetation, both natural and cultivated, along the scarp faces and in the hollows of the gullies. This includes good strands of typical monsoon forest. The gullies have numerous springs which feed the rivers down below.

As the *Gazetteer* of Goa describes it: 'The laterite plateau with clumps of grass and thinly spread cashew shrubs, often with a church or a cross perched, skirted by greenery of coconut palms and natural growth, deeply entrenched notches of low grounds with betel and coconut gardens, the *kulagars* and the plateau base sharply merging into the alluvial flats below, form a recurrent theme in the landscape of most of central and coastal Goa.'

The more prominent are the plateau lands of Pernem, Mopa, Morgim and Assonora (North), and Ponda, Kundaim, Betul, Sanvordem and Quepem (South). Associated towns include Assonora, Bicholim, Ponda and Quepem.

This part of Goa contrasts with coastal Goa in more ways than one. While the coastlands carry a Latinized landscape, this is a region of Hindu iconographies, expressed in numerous shrines and temples, the most important of which are the shrines of Mangueshi and Shantadurga.

PLATEAUS AND INDUSTRIES

The statutory Regional Plan for Goa is based on the idea of dispersing industry to the hinterland. When the Plan was being drawn up, it was assumed that the railway project (now Konkan Railway) aligned through the hinterland would very admirably serve the new industrial centres. The midland region is the only belt which is available for the location of industries (large or small) and industrial estates. Traditionally, Goan villages have never been located on plateaus. Villages have congregated either in the plains, the undersides of plateaus or the coastal stretches. In the Ghat section, settlements are extremely sparse, with more hamlets than villages. So it came naturally to planners within government that if industry were to come up, it would have to make a virtue of the plateaus.

Therefore, about 80 per cent of the industrial complexes and estates have been proposed one time or another for siting on the plateaus that occupy the midland region. Zuari Industries (formerly Zuari Agro Chemicals) inaugurated the trend in the early seventies, by occupying Sancoale plateau, but it also provided a direct taste of the environmentally destructive impacts of units located at such sites. If Du Pont's Nylon 6,6 project proposed for Querim plateau ultimately failed, this was partly due to the negative public perception over Zuari Industries.

The Regional Plan blandly assumes that the plateaus in the midland region are bare open spaces bereft of vegetation and therefore ideally suitable for industrial estates. This is an erroneous assumption, since most plateau areas in Goa do perform important ecological and social functions:

1. The plateaus function as harvesting areas for the collection of rainwater which after seeping into the ground emerges in the form of numerous springs, on which several of the garden orchards growing at the base of the plateaus exist.
2. Dhangars and farmers treat the plateaus as a common grazing pasture for their animals, for the soil here is partial to the growth of grasses.

It stands to reason, therefore, that any proposals to locate industrial estates on the plateaus are bound to have negative environmental consequences for the rich and fertile gardens at the base of these tablelands. They are also bound to lead to a further restriction on the movement of village and dairy cattle in the region.

There is one other major implication of locating these industrial estates up on the plateaus. Any activity on the plateau tops which produces effluents or toxic wastes of any kind is bound to be hazardous, as the wastes and effluents are certain to leach into the valleys below and pollute springs, sweet water rivers and other water bodies. For instance, the continuing pollution of Zuari Industries on the Sancoale plateau has led to the degradation of the Dorvol springs. These springs were once a great source of enjoyment for picnickers, besides having been proposed as a source of water for supply to the city of Vasco.

INDUSTRIAL TIME BOMBS

Large companies have proven to be a curse on the environment of small Goa. Not only are they able to corrupt the entire administrative structure and defy environmental standards, they remain a permanent source of major hazards to the community and environment at large.

Zuari Industries Limited (ZIL—earlier, Zuari Agro Chemicals) and Hindustan Ciba-Geigy (now Syngenta) are potential chemical time-bombs. They are also associated with environmental offences. The State's pollution control machinery seems incapable or unwilling to take any measures against them.

If the Kaiga plants are the terrifying nuclear bomb in Goa's geographical basement, these two chemical bombs and a couple of gaseous ones, with devastating potential, continue to tick away in the very heartland of this state.

Several warnings have been sounded and there have been a few close calls over the years. Yet, successive governments have refused to strictly enforce safety measures. Only recently, due to the efforts of the South Goa Collector, have industries in south Goa prepared a Disaster Management Plan.

Zuari Industries Synthetic Fertiliser Plant — The oldest and popularly most feared of these, of course, is the Zuari Industries fertiliser plant at Sancoale, next door to the naval and civil airport and the densely populated port town of Vasco-da-Gama.

Mass fish mortality and pollution of fields and ground-water in the mid-70s earned it enduring notoriety. In spite of the forced closure of the plant by the court and the taking of several remedial measures, air pollution has continued, though to a lesser extent. And, most importantly, the primitive handling and storage of hazardous chemicals have compounded nightmares, as quantities and plant capacities have increased, with or without sanction from the relevant authorities.

The biggest threat is ammonia, the lifeblood of the plant. Tanker-trucks, often in poor condition, loaded with it, zooming down Goa's winding roads are a persistent threat to people and environment alike. Stack emissions,

Fish mortality due to Zuari Industries pollution



at timings perfected to beat watchdogs, irritate eyes and noses of people living downwind of the plant, chronically serve as grim warnings of what is in store, should there be an accident. And that cannot be ruled out, given the way ammonia is stored by ZIL.

A close call, it seemed it was, when public notice was drawn to the fact that the plant's 3000 tonne-capacity hortonsphere (a globe-like pressurised storage tank) had developed cracks in the mid-80s. The seriousness of the problem seemed underscored when it became known that ZIL was building 'an alternative' of similar capacity. Goa Foundation's intervention to secure proper addressal of the hazard from the courts failed. ZIL commissioned the second hortonsphere in 1987 and has been using both since then, doubling the hazards associated with such pressurised vessels.

The bottom line on this problem is that hortonspheres are not used by ammonia-user plants around the world anymore. But what is particularly galling is that ZIL built the second hortonsphere in the face of opposition from Goa's Inspectorate of Factories and Boilers and got away with it. And, as a very senior officer of the Inspectorate points out, if these unsafe storage tanks burst, the people of Vasco will have no time to escape; the people of Panjim may have ten minutes.

Another hazardous chemical used by ZIL is the highly flammable solvent, naphtha. In this regard, the specific threat is posed by the pipeline through which naphtha is pumped under the city from the harbour to the plant. There are no contingency plans to cope with a leak in the pipeline and the consequent fire. ZIL and the government also prefer to believe that such a fire will not race back to the harbour or the plant, even though experts estimate that people in a radius of five kilometres will not be able to bear the heat from a fire in either of the naphtha dumps.

Soon after its diammonium phosphate (DAP) plant was commissioned in 1983, the company claimed zero pollution. It was touted that all dangerous effluents were being recycled to produce DAP. According to information supplied by the company, the treated effluent water is re-used and sent to the DAP plant where it is mixed with the fertiliser which is sold to farmers. Whether the farmers are aware of the company's efforts to involve them in the final disposal of its allegedly treated effluent is not known.

Air pollution from the factory has continued with impunity for over 25 years simply because the standards for ammonia in ambient air were not notified by either the Central Pollution Control Board or the State Board. Since 1992, these standards have been fixed at a daily average of 400 ug/m³ and annual average of 100 ug/m³ in some areas of the country (like Kerala). When monitoring was done in 1993, it was found that ammonia rates were alarming.

Despite directions of the High Court to start regular monitoring from April 1998, this was only done in May that year, when the plant was being shut down for annual maintenance. Even so, the emissions were excessive. The company has always avoided raising the stack height and now hides behind the fact that the plant is in a naval area and raising the stack height may be hazardous to aircraft.

ZIL continues to try to avoid monitoring of the pollution being caused by it. Ingenious methods are resorted to by the company in order to get off the hook.

Locations for the air quality monitoring stations were fixed at a distance of over 1 km from the plant. This eliminated the locations close to the plant which showed excessive ammonia concentration. Thus, rather than reduce the pollution, the ZIL has succeeded in having the monitoring stations moved further away. As for the pipe for effluent discharge, this continues to leak into the Poim creek, leading to fish mortality. Fresh leakages have begun to appear in other areas below the plant.

After the judgement in the writ petition, Zuari Industries was for all practical purposes placed under permanent monitoring of the High Court.

However, as the adage goes, it is not possible to teach an old dog new tricks. Zuari Industries is a law unto itself. Recently, the company doubled the capacity of the plant without bothering to ask for permissions from any of the statutory authorities and in complete violation of the CRZ notification which explicitly forbids expansion of industries within 500 metres of the high tide line (HTL).

The company in fact filed a writ petition in 1998 in the High Court declaring its intention to double the manufacturing capacity of the NPK and DAP Plants from 1.5 lakh metric tonnes to 3 lakh metric tonnes. The company blandly stated in its annual report that it had expanded its DAP Plant from 500 to 1100 tonnes per day (1,50,000 to 3,30,000 tonnes per year) at a cost of Rs 21.52 crores. It also stated in the report that it had undertaken expansion of its NPK Plant at a cost of Rs 41.70 crores. The Goa Foundation enclosed copies of these documents in separate letters to the Pollution Control Board and the Goa Coastal Zone Management Authority. Till date, we have yet to hear from these authorities about what action they have taken against the company.

As if this were not enough, the company has now raised the environmental stakes in Vasco city, by locating ammonia storage tanks within the Port jurisdiction. If there is an accident there, we may as well say bye-bye to the town and its citizens.

Syngenta — A recurring nightmare is that an accident at the Syngenta plant at Santa Monica (near Old Goa) will do to the vital Mandovi and Goa what the mishap at the Sandoz plant did to the Rhine and several European countries a few years ago.

The company itself is acutely aware of the possibility and has spent considerable amounts on pollution control equipment and processes. Yet, suspicion and fear continue.

An important element in the effluent treatment process is the continuous bioassay test (also conducted by ZIL). This test has become the butt of jokes over the years, the main allegation being that the job of those supposedly monitoring the effluent, round the clock, is to replace the fish as soon as they die. The fact that the fish tank in which the test is conducted is no larger than a household aquarium does little to reduce suspicion.

Syngenta also boasts equipment to recover methyl chloride from the gaseous (air) effluents and scrubbers to treat 'obnoxious gases like chlorine and hydrochloric acid'. Villagers living downwind of the plant however regularly complain of a sweet smelling compound assailing their nostrils.

An abiding fear is that polychlorinated biphenyls (PCBs) are being discharged and that the much-touted

incinerators installed do not burn these carcinogens which are resistant to biological and chemical degradation.

Unfortunately, the Goa Pollution Control Board does precious little analytical work and it will be decades before the suspected PCBs show large scale damage to liver, kidneys and reproductive systems.

Yet, an indication of the persisting danger is an admission made by the plant's General Manager himself in 1990. Writing about 'big projects on hand for renewal of the partially 17 year old installations for the manufacture of Phosphorus Trichloride and Monocrotophos' (the plant's original products), the executive confessed they would improve 'ecology and reliability aspects'.

Exactly how ecologically safe and reliable these and the other installations are, will—God forbid—be known only if there is a major accident.

Minor accidents are, of course, already on record. Employees have been dying and Syngenta's management has been warned that safety training is not quite as adequate as it should be. It may just be too late if the necessary training is delayed too much.

The problems caused by the plant affect areas that one would think were safe, given the geographical distance. But the transport of hazardous chemicals, to and from the plant, has already led to accidents and leakages (see pages 78-79).

HPCL's LPG Plant — The third time bomb in Goa's heartland is the Liquid Petroleum Gas refilling plant run by Hindustan Petroleum Corporation Limited, one of the world's biggest companies.

Situated within the Kundaim Industrial Estate, amidst dozens of other factories, the plant has three huge storage tanks, with a total capacity of 120 tonnes which could blow the area for miles around to smithereens, if an accident occurs.

HPCL's management was advised to acquire land around the plant in order to create a buffer zone and decrease chances of accidental ignition of the LPG tanks. The advice was ignored, apparently because the company was confident any delay in setting up the plant would bring the wrath of thousands waiting for LPG cylinders down on the heads of those suggesting the safety measures.

Given the extremely hazardous nature of the three plants in question and the fact that two have been around for over 20 years, one would have thought the government would be concerned enough to ensure minimum risk to the general population.

The Chief Inspector of Factories has repeatedly requested constitution of an expert panel to assess the risk and disaster containment plans. He has pointed out that nobody is quite clear about exactly what will happen, if there is a major accident at any of the plants, as even quantities of hazardous chemicals being used at any given time are not known. The government has been warned that hundreds could die and thousands may be affected. Yet the bombs continue ticking away ...

THE FIGHT TO RESTORE THE DORVOL SPRINGS

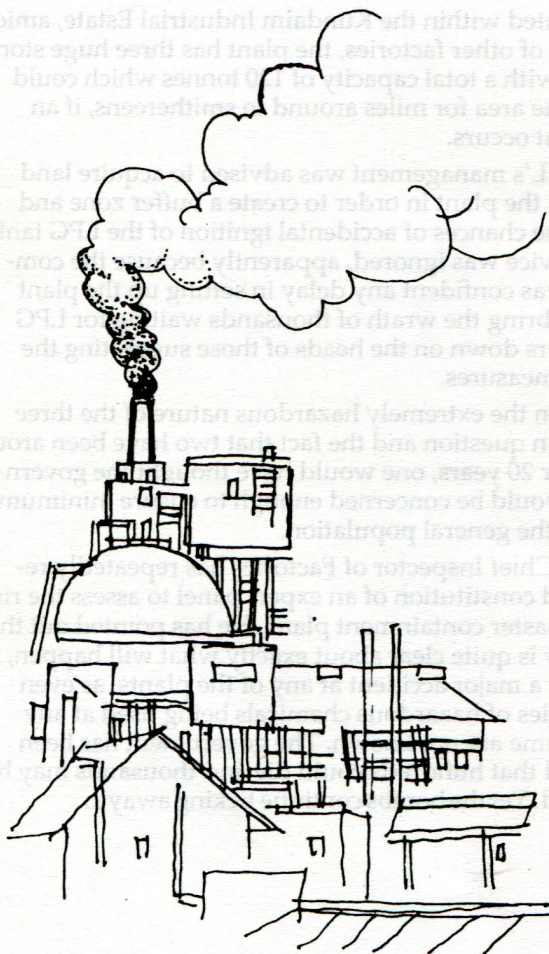
In 1977, Francisco Barreto, who owns a coconut plantation by the side of the Zuari Industries plant, discovered that effluents were seeping into the Dorvol springs.

He insisted that the Public Health Laboratory and its Pollution Control Cell take regular samples of the waters of the spring. The data for the period 1977-85 is truly appalling: the contamination shows ever higher and increasing values. By 1980, the Pollution Control Cell ruled the waters unfit for human consumption.

The famous Dorvol springs, a priceless Goan heritage, is privately owned by the Barretos, but the family allowed the general public access to it as a matter of tradition. Schools would bring their children on picnics to the site from different and distant parts of Goa.

In too many parts of India, people have sat by and watched helplessly as their water resources have been destroyed by factories like Zuari. Barreto was made of sterner stuff. He decided he wanted his springs back in their primeval state.

In 1977, when Francisco Barreto first noticed the pollution of the Dorvol Springs, he also got in touch with the Central Water Pollution Control Board. His correspondence with the Board is important, for it demonstrates how arrogant and uncaring the Board can be when approached by aggrieved victims suffering the impact of polluting industries.



In this case, the Board sent Barreto a letter stating that ZAC's pollution was well within limits and that the villagers had no alternative but to bear any accidents patiently. In his letter to the Board in March 1978, Barreto insinuated connivance of the Board with the ZAC management. The Board demanded an apology. Barreto stood his ground, replying that he had expressed bona fide suspicions. The Board, thereafter, sent a lawyer all the way from Delhi to intimidate Barreto, but seeing he was a man difficult to budge, the lawyer returned to Delhi and nothing more was heard from the Board.

On February 9, 1981, the Directorate of Health Services sent in a fresh technical report, which now noted: 'Comparing the results of the natural waterfall at source and along its course where various seepages join, it is confirmed that the Dorvol Falls water still receives effluent, seeping into the Dorvol property.' The Director of Health Services asked the factory management to locate and plug the seepages. Nothing happened.

In reply to a calling attention motion in the Assembly, the government however claimed the pollution was under control, and then added, illogically, as all governments do: 'To safeguard the health of the inhabitants, it was declared that the Dorvol Spring water is unfit for human consumption.'

Barreto returned to the Pollution Control Board. On September 23, 1981, he registered fresh protest against the continuing pollution of the springs. The Member Secretary B.D. Aggarwal replied a month later, 'that since the underground strata had become soaked with ammonia bearing water, it will take a long time for the wells and springs to get to an unpolluted state, even if there is absolutely no fresh pollution caused.' He concluded by declaring that the Dorvol Springs (which he had neither ever seen nor inspected) 'fall into F category and we cannot accept the springs as a national body of water.'

Barreto replied to that, rejecting out of hand the notion that the present pollution was the result of residual effects and not acts of fresh pollution, and roundly condemned the F category classification of the springs, citing an order of the erstwhile Portuguese regime to use them as a source of water supply for Vasco and Mormugao. He also stated that since the area is close to the sea, where wells are scarce or nonexistent, the spring waters and their purity are essential to public interest.

In October 1981, the Board got in touch with Barreto again, informing him that necessary steps to assess the extent of seepage from ZAC, and to stop it, were being taken, and that in regard to the public utility of the springs, the Board would seek the views of the Government of Goa. Barreto reminded the Board that the Water Act, 1974, 'provides for maintaining or restoring the wholesomeness of the water of a well or a stream, of public as well as private utility, without any discrimination whatsoever.'

In reply to that the Board got even more arrogant. It is important to note that this is an agency set up by law to safeguard the quality of our water. The member-secretary wrote:

'All bodies of natural water cannot be maintained or restored to a quality fit for human consumption, and the only practical approach is to classify such bodies of natural water into different categories and thence to decide the quality maintained in them. It is the prerogative

tive of the Board to decide as to what should be the classification of any particular body of water and what should be the quality of water to be maintained in it ... to my knowledge the Dorvol Springs have not been used for human consumption during the past some time and I see very little scope of its being used for this purpose by any significant number of people.'

Barreto returned the salvo. 'The Dorvol Springs,' he wrote, 'are most wholesome and potable and as such utilised by hundreds of people for drinking purposes.' Further, he said, 'the local government, immediately after the said pollution was brought to its notice in 1977, declared the waters unfit for human consumption and directed the ZAC management to display boards ... warning the people not to drink the same ... To classify the waters of the springs at this late stage, based on their use during the post-pollution period, is tantamount to indulging in a mockery of the Act.'

Things changed dramatically after the member-secretary Aggarwal himself visited the springs in April 1982. He returned to Delhi ecstatic, and now danced to a different tune. In a letter dated April 27, 1982, to Barreto, he said:

'I am deeply impressed with your keen concern for the conservation of the environment in that area. I am convinced that the Dorvol Springs are a gift of nature and we cannot afford to get these polluted or destroyed through our intransigence. I wish to assure you that I will be taking all action necessary to ensure sequential reduction in the pollution of these springs from the polluted effluents of M/s ZAC so that their natural unpolluted status can be restored in the near future. I used the word 'sequential' since I would not like to make any impractical assurance and since you would also appreciate that construction and repair of civil works takes time and that natural systems are sometimes a little slow to respond. But I assure you the scale of time I have in mind is in terms of months and not in terms of years.'

A year later, Barreto informed the Board that since the pollution still continued, it had failed to perform its duties as contemplated under the Act, and served notice of legal action. On December 1, 1983, he filed a suit for a permanent injunction against the ZAC in the district and sessions court of South Goa. He also made the Board and the Goa Government respondents. Simultaneously, he pleaded for a temporary injunction. The temporary injunction was not entertained on technical grounds that he had accepted some compensation, proving that the damage done had been recompensed.

Barreto now commenced filing complaints against the factory under the Environment Protection Act, 1986. Since the authorities refused to take samples of the water and air emanating from the factory premises, he filed a fresh writ petition (with The Goa Foundation as second petitioner) for directions to the Chief Inspector of Factories and the State Pollution Control Board to take samples. The

petition was admitted on 6-10-92. Prior to its admission, an application by the petitioners to get the waters of Dorvol Springs analysed was allowed. The results showed pollution. In April 1993, the High Court again allowed a fresh application from the petitioners directing the NIO to take water samples from the Dorvol Springs.

The Writ Petition filed in 1988 by the Goa Foundation and Francisco Barreto in regard to hazards from Zuari Industries and the cleaning up of Dorvol Springs was eventually decided by a judgement of the Bombay High Court in 1998. In the judgement the court issued several directions in respect of the Dorvol Springs. As the court was informed that the Bhabha Atomic Research Centre (BARC) was doing an investigation, it directed that the result of the investigation was to be produced in court when completed. BARC eventually completed its report but was unable to exonerate Zuari Industries from the contamination of the Dorvol Springs. Since the methodology that BARC followed was not set up to find the answer, the Court has now ordered Zuari Chemicals to conduct further investigations of the plant through FEDO, and to find out the source of the leakages of the effluent into the Springs. The Court has also directed that the Goa Foundation should be present at the factory site when the investigation is being carried out.

Francisco Barreto has fought Zuari Industries Limited now for more than twenty five years



Aggarwal had promised Barreto in 1982 that the pollution would be controlled 'in a matter of months'. Nearly twenty years have passed but even today the Dorvol Springs continue to be polluted, their waters unpotable, though the pollution in the Springs has very much reduced.

Barreto however does not intend to rest until the Springs are restored to their pristine quality. Every citizen of Goa should know of his work and support and applaud him. At stake is not just a priceless legacy of the Dorvol Springs, but the issue of whether any industry can pollute water sources and get away with it.

DU PONT: OUT OF GOA

Decisions concerning technology import are rarely ever made in this country. Nothing illustrates this truism better than the case of Du Pont's Nylon 6,6 plant. Installed before World War II at Richmond, USA, and milked for all its worth there for more than 50 years, Du Pont decided it could now be sent to India to be flogged for another fifty years.

Through an Indian collaborator, the business house of Thapars, Du Pont scouted around and eventually chose a large, apparently barren plateau at Querim in Goa, which could be accessed easily from the seas. Du Pont's global marketing strategy required that the adipic acid for the plant would arrive by ship from Singapore and the Hexamethylene Diamine (HMD) likewise from Texas.

Thus the decision to produce Nylon 6,6 in Goa was made neither by the Goans nor was it a result of any serious research or thinking undertaken by government or business. It was simply part of Du Pont's global strategy to maximize its own profits. That the proposal had to be coated in sugar and offered to the Indian government and the public in development terms was not in itself unusual. This happens all the time. Every time a decision is made in multinational headquarters to dump obsolete technology on the third world, it comes gift-wrapped in development jargon: jobs, enhanced revenues, technology upgradation, progress, nation-building, dividends.

And what about the environment? What about the proposed plant's impact on the local ecosystem?

Du Pont began by saying the Nylon 6,6 technology was 'pollution-free'. A chemical plant being pollution free? Later, it admitted there would be pollution but claimed it would install 'state of the art technology' that would render the air and water coming out of the plant process cleaner than what went in!

This is certainly not the kind of technology being applied by Du Pont in its other plants worldwide, including those within the USA. The record shows that Du Pont, according to US Government figures, is still the largest polluter of the planet in terms of the total quantities of solid, liquid and gaseous pollutants it discharges into the environment. So how could Goa be an exception?

The decade-long story of the Nylon 6,6 project in Goa is replete with chicanery, duplicity, corruption and wholesale disregard of all environment norms. To start with, the Thapar Du Pont Ltd. put up the Goa Economic Development Corporation (EDC) as a front to procure licenses and approvals. The EDC did not disclose on its application in 1983 for a Letter of Intent (LOI) from the Government of India that the manufacturing process—which involved the discharge of air pollutants, contaminated liquid effluents and solid wastes—would have enormous environmental impact on the surrounding environment including water resources, forests, plantations and the total environment of the villages within an area of 25 km surrounding the proposed site.

Instead, in its application, the EDC withheld important information from the Government and thus procured the LOI in 1985. When asked if there were any sanctuaries or national monuments nearby, it replied in the negative. There are, however, numerous notified heritage sites within 25 km of the site. Some are within 5 km of the proposed site. At the time the application was made, the industrial policy forbade the location of industries within 25 km of protected national monuments. There is a proposal pending even now before the Goa Government for declaring a major portion of the Ponda taluka as a conservation zone in view of its historical, religious and tourist importance.

Nevertheless, the Chief Town Planner and the State Director of Industries both rejected the site when the proposal was placed before them. In his order dated 20.11.85, the Chief Town Planner stated as follows:

'The proposed alternative site for the above industry at Querim village in Ponda taluka cannot be agreed to from the Planning point of view. You may please note that there are more than five existing and proposed industrial estate/areas in Ponda taluka. Any new industry can easily be accommodated in one of these areas, and there is no need of releasing new areas in Ponda Taluka for industrial development at this stage.

'Moreover, the location of the industry on the Querim plateau at a height of more than 150 m will have some serious ecological consequences on the surrounding orchard lands. The area is rich in the groundwater resources and a few sweet water channels, which should not be disturbed by any organised industrial development on the plateau. Besides, the exploitation of the

Book Review

A good account of the struggle against Du Pont is available in Marathi—'*Bhutkhambacha Lokaldha*' by Kamlakar Sadhale, the architect-activist from Ponda.

The book clearly brings out the determination of the people of Querim and the surrounding areas to ensure that the polluting Thapar-Du Pont plant did not come up in an area of great environmental importance. Starting with a description of the Midlands-Western Ghats area around Querim, the book moves on to focus on the issues involved. A large part of the book documents the process whereby the struggle against Du Pont was waged, and the lessons from this can inform

and inspire other such struggles. It is available from *Nirmal Vishwa*, Sarjyotishi Colony, Kadpabandh, Ponda, Goa. Price: Rs 175/-



Book Review

Unwanted Guest—Goans v/s. Du Pont
Edited by Claude Alvares (1991) pp190

Tells part of the story of Du Pont in Goa. The book also contains the full text of the Report of the Goa House Committee set up to investigate the irregularities in the possession of land of Querim Comunidade and related aspects on pollution, issue of licences, etc., involving the Nylon 6,6 project. The committee recommended the plant be permanently shelved.

The book also includes an introduction to the Du Pont proposal in Goa by Claude Alvares and articles by Devika Sequeira and Ashwin Tombat.

sweet water springs will also adversely affect the thriving arecanut plantation at the lower slopes.'

The Director of Industries too in April 1987, rejected the project stating as follows:

'Before giving final approval on the site location for this project, it may be worthwhile examining it from the point of view of ecology, pollution and loss of huge area of 20 lakh sq m.

'This industry has been categorised by the Government of India as an Industry of a highly polluting nature. According to the Government of India, entire territory of Goa, Daman & Diu has been identified as Protected District and Non-Polluting Industry District vide their letter No.10/157/85-LP dated 17/2/87 (copy enclosed) & hence encouraging such an industry needs careful examination.

'We already have in this territory quite a large area which is occupied by highly polluting industries. Should we bring in within the grip of pollution still larger areas by encouraging this industry is a matter for greater study particularly, in the light of the comments of the Chief Town Planner, who has not agreed to support the location of the project at Querim.

'The area asked by the party is 500 acres which is equivalent to 20 lakh sq m, which is unreasonably on the higher side. In fact 20 lakh sq m can easily accommodate more than 10 Industrial Estates, can encourage more than 500 small industries and can create employment to about 4500 people approximately and give a bigger boost to our economy by opening various other avenues for other trades and small activities.'

As the relevant state authorities had thus not approved the siting of the plant at Querim, the factory's location should have been shifted elsewhere. However, both Du Pont and the government continued to push ahead for locating the plant at the aforementioned site. Multinationals are not used to taking no for an answer. Large companies are also a source of enormous illegal gratification for politicians all over the world. The standard tactic of multinationals like Du Pont in setting up their plants is to buy up local politicians and leaders to gain permissions they would never get otherwise.

As stated earlier, Nylon 6,6 is produced from two basic chemicals, both of which are hazardous to living beings. Both adipic acid and HMD are recognised by the US Environment Protection Agency as hazardous materials. HMD is also notified as a hazardous material following the notification dated 27.11.89 issued under the EPA, 1986. Under section 41 (A) of the Factories Act, 1948, inserted by an amendment of Parliament after the Bhopal gas disaster, the Goa Government ought to have set up a Site Appraisal Committee to examine whether the site was adequate for location of a factory dealing with hazardous materials, particularly in view of the conditions imposed in the LOI. However, no site appraisal

committee was appointed by the Government despite the fact that two of the State authorities had already openly and in writing expressed their rejection of the proposed site.

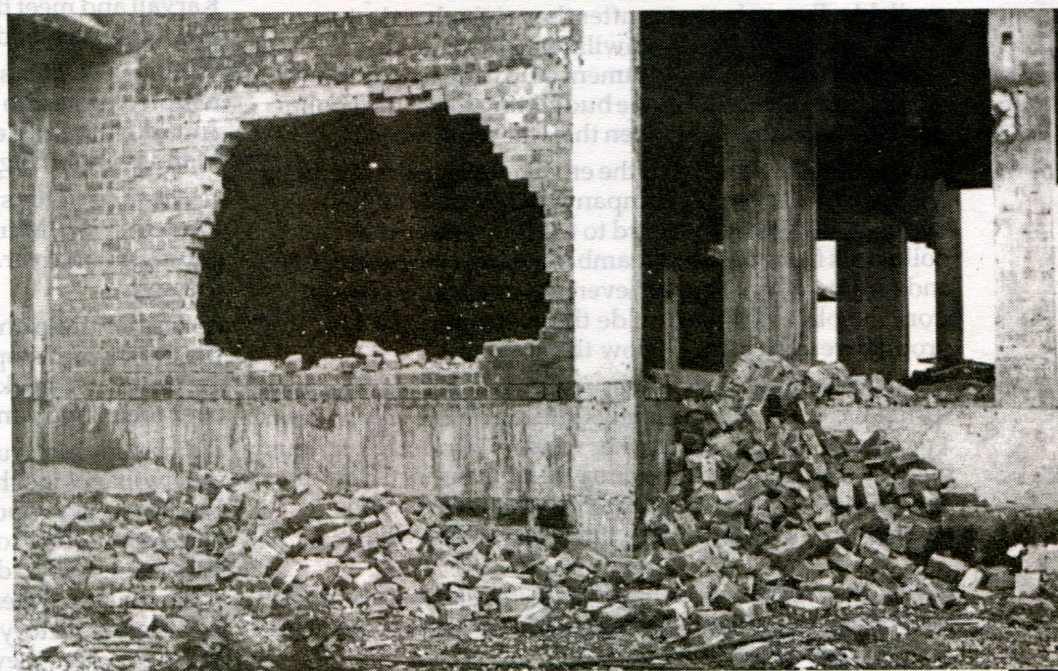
On the contrary, in June, 1988, a special meeting was called by Chief Minister Rane to discuss the project. The CM had earlier opposed the project. However, for reasons best known to him, he subsequently went out of his way to promote it. At the meeting, the CTP's objections to change the use of the land from green area to industry were arbitrarily overruled by the CM.

When the proposed land use changes were notified on 24.11.88, all the objections received from the public were summarily ignored by the State Government.

In the meanwhile, TDL succeeded in procuring questionable NOCs from the Central Water Pollution Control Board (when Goa was not yet a state) and the State Pollution Control Board. The NOC of the Central Board was in the nature of a list of standards of a general nature which one could get from any text book. There was no study of the site proposed or of the plant equipment.

In fact, the Chairman of the Technical Advisory Committee of the SPCB, in his submissions before the House

Du Pont buildings after they had been demolished by protestors



Committee, acknowledged that the Board had only granted an NOC for the civil works and not for the plant. The Chairman admitted that since there was no Nylon 6,6 plant anywhere in Asia, they had no occasion to study the technology involved. He then denied that his Committee had cleared the plant.

On January 28, 1994, the Ministry of Environment and Forests Respondent issued a notification under the Environment Protection Act, 1986, making it mandatory for several large projects listed in the Schedule to the said notification to obtain prior environment clearance from the Environment Ministry. Nylon 6,6 falls in Schedule 1 of the said notification. However, no environmental clearance as required by the said industry was obtained by the EDC or TDL.

In May 1994, several prominent citizens of Goa including leading intellectuals and educationists presented a memorandum to the Chief Minister demanding cancellation of the project once and for all. The memorandum provided a summary of all the reasons why the project ought to be cancelled. It was only the latest of such initiatives. A few years earlier, a massive meeting of NGOs and citizens in Ponda had issued the 'Ponda Declaration', demanding the project be shelved due to its ecological implications.

In addition, Goan environment groups were hardly convinced that Du Pont was serious about its environmental commitments. According to the division of responsibilities for the proposed project, the main process was being supplied by Du Pont, whereas all operations outside the core area would be maintained by TDL.

In October, 1994, environment groups procured a copy of an email message from Du Pont (US) to Thapar Du Pont (India) which set out four crucial areas of pollution control which TDL had yet to study adequately and take decisions upon. The main point raised in the email was who would pay the \$100,000 for the consultant's study required for designing environmental safeguards in view of the above four problems. Du Pont said the costs should come from TDL, whereas TDL said it was not its responsibility. Both referred to Du Pont Far East which said no money was available. Even nine years after the original project was submitted, Du Pont was unwilling to put a mere US\$100,000 into an environment study regarding these critical parameters, let alone budgeting for critical pollution control equipment when this was required.

It is thus apparent from the email message that let alone the Board, not even the company had carried out the required studies with regard to the flow patterns of pollutants from the Bhutkhamb plateau to the productive and fertile valleys below. Seven major springs emerge from the plateau and provide the sustenance for the productive agriculture below the plateau:

Shikretalem Zor: This comes out at Arla in Keri. The main spring has a number of springs joining on the way to form a perennial stream. The spring water is banded at various places to form small reservoirs which serve horticulture, agriculture, and provide drinking water needs of the residents. When the stream comes out of Keri village, it

enters Priol village, then Veling village and joins the Zuari river at Madkai. All along the route it serves areca and coconut groves, paddy fields and wells in the vicinity used for drinking water and agriculture.

Shitolem Zor: This spring is specially useful for the houses in the higher stretches of the hill slope in Kavangal in Savoi Verem village for drinking water and horticulture because it comes out of the hill at a great height. It travels through the lower areas of Kavangal and meets Mandovi river.

Zarovnem Zor: This spring is also at high level and provides drinking water to the tribal population of Gavlis on the plateau touching the TDL plant site. It also irrigates the orchards at higher stretches and joins Dabavorchi Zor.

Dabavorchi Zor: It is strengthened by water from Zarovnem Zor from higher level at Parpati wada. Then it enters the Keri lake and travels through Kalajeer, Daigode, Priol, Mardol and Karnal and meets the Zuari river. All along the route it is banded and serves the local population's day-to-day needs of water and also irrigates areca and coconut groves and paddy fields. As it passes through the central part of Keri village, it is very useful to the local population.

Gomtale Zor and Nalle Zor: Both these streams join together and pass through Kuncolliem, Mangueshi and Karvali and meet the Zuari river. They irrigate horticulture farms and paddy fields.

Anole Zor: This spring emerges near Shree Vijayadurga temple, forms into a lake and then runs through Amarkhandem, Keri, Velkas, Chafad etc. and joins the Mandovi river. Big areca farms are irrigated by its water.

Fondi Zor: This spring runs through Wangal, Keri, Wadem, Priol, Mardol etc. and meets the other streams joining Zuari river. It irrigates areca and coconut farms on the way.

Besides these, there are small tanks, wells etc. all along the downward slopes and at the foot of the hills. The groundwater stock serving them is recharged by rainfall over the plateau and hill slopes.

The people of Querim, Savoi-Verem, Khandola and other villages in whose immediate environment the Nylon 6,6 plant was proposed are simple folk: farmers for generations, most of them are employed on their horticulture farms and paddy fields. When news first came to them that the government was going to help Du Pont put up its giant factory right on top of the plateau adjoining the area where they carry on their livelihood, they decided to first collect information on the plant.

The material they eventually collected on Nylon 6,6, Du Pont, and the Thapars was so voluminous, it enabled them to stand firm despite contradictory information from the so-called experts. One series of experts testified that the plant would be a disaster. Another set, brought to the site by Du Pont, insisted the plant was safe. The villagers reserved judgement.

The villagers primarily feared that the air and water pollution from the factory would devastate their environment and destroy thousands of hectares of rich agricultural and horticultural plantations raised by them in the region. Not much was yet known of Du Pont, but there was ample scepticism about the Thapars since a Thapar plant in Karwar had been associated with chlorine and mercury poisoning.

Du Pont compound walls knocked down during the agitation against the plant



The adjacent town of Ponda was also hostile to the project since mega factories like the one proposed at Querim are bound to lead to a large influx of migrant labour and a phenomenal increase in truck traffic. Ponda citizens felt this would degrade their environment and eventually destroy the cultural integrity of the region which now hosts the most splendid of Goa's temples.

In 1990, the Goa Assembly, shaken by the controversy surrounding the plant and opposition from the public surrounding the site and from environment groups, set up a House Committee to investigate the entire Nylon 6,6 project. At the House Committee's request, the Goa Government directed TDL to stop all work at the site. (The stay on work would operate for nearly two and a half years.)

The House Committee visited the site and filed a detailed report based on consultations with scientists, government officials and environment groups. It also held public hearings during which TDL made an elaborate presentation of its project.

The House Committee, in its Report, severely castigated the State Pollution Control Board for issuing the NOC. It found the NOC grossly improper and inadequate on several counts. Under section 17 (1) (n), for example, one of the functions of the State Pollution Control Board is 'to advise the State Government with respect to the location of any industry the carrying on of which is likely to pollute a stream or well.' At no time did the Board make such a study of the site, even though by the time it was considering an application from the project authorities, there was already a great deal of controversy and opposition to the site, some of it from government authorities themselves.

The Board was also found entertaining the application after the land at the site had already been acquired for the company. This was another gross illegality since the approval of the site by the Board was required prior to land acquisition. At no time did the Board initiate or demand a proper EIA process for selection of a proper site. Instead, it preferred to accept a site given to it by the company which basically suited the company whether or not it suited the environment.

On water runoff, the report indicated:

'As mentioned earlier, the soil is lateritic with patches of paddy land. Lateritic rock being porous, acts as a sponge, and the whole plateau is the catchment area for the rainfall that feeds the groundwater aquifer, ultimately recharging the wells, springs, and temple tanks. This catchment area is now being destroyed by blasting operations for building the Nylon 6,6 plant. The serious alteration of the geomorphological status of this site can have a serious deleterious effect on the quality and quantity of groundwater as well as surface water flow. To the west of the present site at a distance in the valley is a natural irrigation lake that supplies water to various horticultural farms in the area. As the lateritic rock

surface is replaced by a concrete plain surface, that runoff will increase and water recharge rate will decrease. Thus in the not so distant future, the above mentioned tank supplies could be adversely affected threatening local agricultural and horticultural activities.'

The House Committee report concluded the site was wholly inappropriate and finally recommended that the Nylon 6,6 proposal itself be shelved once and for all due to its potentially negative impacts on the natural environment. However, the Government ignored the report and, despite the stunning adverse verdict, the company (and the government) continued to harp on the Querim site. In November 1993, the government signed a lease handing over 123 hectares to the company. The lease was for a period of 90 years and TDL paid a total premium of Rs 1 crore, 29 lakhs and an annual rent of Rs 5000 (US\$173). In more specific detail, the lease deed handed over the land at a mere Rs 10.52 per square metre and an annual rent of Rs 100 (US\$3) per acre. Land at such cost is not able to even poor Indian citizens.

Once they had the lease in their pockets, TDL officials assumed they could forthwith start work on plant erection. In June 1994, they commenced work on a compound wall. Since they had not sought permission from the Panchayat as required under the law, they were

Anti Du Pont agitators at a meeting outside the proposed factory's gates



stopped by a show cause notice. The company went in appeal against the Panchayat order.

By this time, however, the villagers—independent of the Panchayat—had already decided to take matters firmly in hand. The immediate provocation was the use of explosives by the company which damaged a few houses in the village below. The explosions were detonated by TDL despite objections from the Panchayat. Anger against the plant authorities intensified after weeks of intense village level meetings, massive rallies and *morchas*. In the last of these, held in early October, more than 40 truck loads of agitators descended on the site and organized a massive meeting outside the proposed factory's gates after an auto-*marcha* through Ponda town. They asked for an irrevocable cancellation of the plant.

The villagers first prevented Thapar Du Pont from laying the foundation stone of the factory scheduled for October 7, 1994. Approximately 400 workers including watchmen imported to the site for the factory erection fled the scene on the appointed day and Du Pont officials had to turn back their helicopter from the site. The angry villagers also rendered the road to the site completely inaccessible by trenching it and piling sections with rubble bricks.

On the night of October 12, 1994, a crowd of over 2000 villagers entered the disputed Querim site and razed down several buildings and a periphery wall illegally raised by the company and burnt up expensive construction equipment including two poclain (hydraulic bucket) excavators. The damage was estimated at over Rs 1 crore.

In December 1994/January 1995, three public interest petitions were filed in the Bombay High Court challenging permissions granted to TDL in view of the new Panchayat Act, the land acquisition and the environmental NOCs granted to the project.

But outside the High Court, at the ground level, the agitation soon took on a new fury and irreversible turn. Police helped fuel the fire by arresting Dr. Dattaram Desai, a reputed doctor and convenor of the Anti-Nylon Citizens Committee, and seven of his associates. Dr. Desai was stripped of his clothes, beaten up and taken to the site of one of the road trenches and made to fill it up by the police. The government wished to humiliate the leaders and thus demoralize the agitators. Instead, the actions had a contrary effect.

On the 23rd of January, 1995, a bus filled with American officials attempted to visit the Querim site. They found the solitary road blocked by women and children who wanted to question them. The Americans refused to talk to the people gathered and returned to Panjim where they talked instead to CM Rane. Later in the evening, armed police returned to the site of the blockade and began firing indiscriminately on the women. Two women fell as bullets pierced their thighs. Nilesh Naik, a youth who tried to intervene, was shot point-blank, and died.

An excavator burnt by the protestors during the agitation



In the melee that ensued, the police had to run for their lives. Eight of them were captured and some of them stripped of their clothes in exchange for what they had done to Dr. Dattaram Desai a few days earlier. The three government jeeps that had carried the BDO, the Mamlatdar and the magistrate and a bus that had carried the armed police were burnt to cinders. The following day, the entire city of Ponda was declared closed and a reverse 'section 144' was imposed on the police: they were not allowed to leave the two police stations in the precinct. The agitators next proceeded to the TDL office in Ponda and burnt everything they could find in it, including 700 files, fax and refrigerator machines, guns, and several suitcases stacked with 500 rupee notes.

On the following day, the Panchayat of Querim met at a specially requisitioned meeting and took a unanimous decision under the new Goa Panchayat Raj Act 1993 to reject all files of applications from TDL since the people did not want the factory within its jurisdiction.

The cyclone of events left the company's top personnel stunned and devastated and the response of the Goa administration in complete disarray. TDL attempted to move an application before the High Court, asking for police protection for visiting the site. This was rejected by the Division Bench. TDL also asked for a restraint order against petitioners carrying on the agitation. This too was rejected by the Division Bench.

The environment NGOs that had filed the writ petitions now informed the Court that as a decision had been taken by the Panchayat not to permit the plant within its jurisdiction, and the Panchayat's decision was final, there was no further need to pursue the petitions as the reliefs prayed for had already been taken care of.

TDL's credibility sank even lower a month later with the release to the media of a letter written by the company to the PWD, recording a donation of Rs 25,000 to a private function of the PWD in exchange for upping water supplies to the plant from 2.5 million litres to 5 million litres per day.

In the meanwhile, Goa's environmental groups announced they would make available all existing documentation in their possession to any environment group in any of the states in which Du Pont proposed to relocate their plant. This they would soon be called upon to do. Fairly soon thereafter, Du Pont announced the shifting of the plant to Tamil Nadu. There too, it was unable to commence work on Nylon 6,6 and had to be content with another product. Eventually, it sold out its stake to Sriram, ending its grand entry into India with a whimper.

Claude Alvares

META STRIPS AT SANCOALE PLATEAU

The hunger of Goa's politicians for locating more and more polluting and hazardous industries on available plateaus never seems to get satiated. Even the successful agitation against the Du Pont Nylon 6,6 plant has not made them see reason. They claim, of course, that they welcome these industries to provide employment to Goans. This is palpably false as most of these highly polluting industries are fully automated, guzzle precious energy and water supplies, and the little labour they do employ is usually non-Goan. Nothing illustrates this better than the issue of Meta Strips which occupied centre-stage in Goan public life for almost two years (1999, 2000).

The project falls in the category of what are known as 'dirty' industries: designed to facilitate the transfer of hazardous wastes/scrap from Europe to Goa. After processing the scrap, the valuable metals are to be returned ('exported') to Europe, while the solid waste is kept behind for discharge into the Goan environment, presumably as a gift to Goans in posterity. As the imported brass scrap is bound to contain hazardous components, the proposal violated provisions of the Basel Convention on Transboundary Movement of Hazardous Wastes. Thus, the approval granted by the Government of Goa to Meta Strips to operate a scrap yard and a scrap processing unit was largely a license to convert Goa into a ragpicker of the planet. The plant would also generate air pollution, waste water, and finally, large quantities of solid waste containing hazardous residues which would need to be disposed off in an environmentally safe manner.

Obfuscations and cover-ups — The formal Meta Strips proposal dated September 1996 was approved by the High Powered Coordination Committee (HPCC) of the Goa Government and the Technical Advisory Committee (TAC) of the State Pollution Control Board (SPCB) in a record six days. It was submitted by Nasik Wires, a company which did not exist. The proposal was for a 100% Export-Oriented Unit (EOU) with a project cost of Rs 250 crores. The company was to manufacture copper, copper alloy strips and foils totaling 47,280 tonnes per annum (TPA) with waste generation of 13,920 TPA per annum.

Meta Strips, a new company, was registered in Mumbai in March 1997. A revised proposal was submitted by the new company which proposed to produce a reduced quantity of 30,000 TPA of brass strips and foils but with an enhanced waste generation of 20,880 TPA. The company indicated that it was laying down capacity for producing 90,000 TPA eventually.

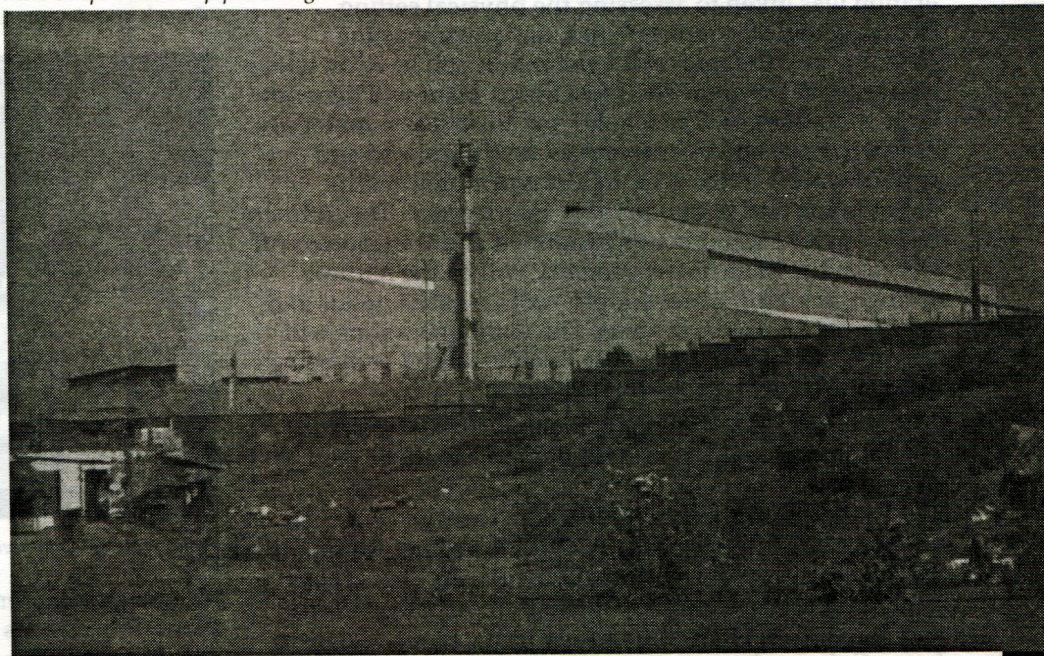
The new proposal was granted an 'NOC to establish' by the SPCB which did not inspect it anew. The SPCB in its order blandly claimed it was approving the plant because

the HPCC had already approved it. However, there was no HPCC approval for the revised proposal which was also now based on a requirement of 4 million litres (4,000 cu m) of water per day.

Fearing opposition from Goa's environmentalists, Meta Strips paid SGS, Hyderabad to conduct an EIA (Environment Impact Assessment). The so-called EIA is replete with obfuscations and errors. It neglects to describe the study area properly and the fact that the proposed project violates industry siting guidelines. (The plant site has been selected for its proximity to the port and the highway and other facilities and not out of environmental considerations.) The SGS study skirted practically every important issue and ignored all environmental issues, ending by giving the project a clean chit.

The reality of the project — What is it that the company sought to hide through all these means? An analysis of the project led to some alarming conclusions. The reports of various independent experts, including Themistocles D'Silva, the Goa Foundation, Purshottam Khanna and Sagar Dhara all clearly indicated that the Meta Strips project was of a hazardous nature. Copper and brass scrap processing lead to emissions of toxic heavy metals, which cannot be quantified and properly predicted, since the scrap being processed would naturally be of varying

Meta Strips brass scrap processing unit at Sancoale



characteristics. The emissions would often be at unacceptable high levels.

According to one technical expert, the project could prove to be potentially dangerous because the raw materials could generate emissions of toxic and carcinogenic metal fumes into the air, affecting a population spread over a very wide area, leading to an increase in the lifetime cancer risk to a population residing within a radius of 10-15 km around the plant. Possible hexavalent chromium and cadmium emissions posed an unacceptable risk. SO_x and NO_x emissions from the plant were also serious factors. Phytotoxic emissions could cause damage to trees, and manganese concentrations in soil could lead to illness among cattle and wildlife. The unit

would generate hazardous wastes which would have to be safely disposed of, under authorisation from the SPCB.

Meta strips and groundwater pollution — A hydrogeological impact assessment was done at the proposed site of the Meta Strips plant by Mr. James D'Cruz, an experienced hydrogeologist who is at present Principal Hydrogeologist and Associate with Canada Engineering Services in Toronto, Canada. D'Cruz felt there was more than sufficient cause for serious concern about the impact the plant could have on the hydrogeology of the area. He wrote:

'The Meta Strips plant is situated on a plateau like feature of laterite rock. The site acts as a source of recharge for the ground and surface waters in the low land valley areas. Recharge to the groundwater systems comes from rainfall that enters the ground through a network of fissures and fractures in the surface lateritic cover. Groundwater that occurs in the detrital lateritic aquifer manifests itself in places as natural springs, and provides the base flow to support surface water bodies and groundwater wells in the low-lying valley regions... The Meta Strips plant is located on a hydro-geologically sensitive recharge area. Groundwater recharge areas are considered unacceptable locations for siting industries with a high risk contaminating potential.

'While siting the plant, it is unfortunate that no consideration was given to assessing the physical setting, hydrogeological characteristics, the contaminating potential and the impact the operation will have on water resources in the area. The Meta Strips plant will generate large quantities of liquid, solid and toxic waste materials. This will have an adverse impact on the ground and surface waters in the area, in terms of water quality degradation and water quantity interference. The ultimate receptors for contaminants generated and transported off site from the Meta Strips property will be the natural springs, drinking water supply wells, surface ponds and streams in the lowland areas. The plant operations will seriously endanger the health, livelihood and well being of citizens in the surrounding villages.'

In this kind of a scenario, it is small wonder that local people soon found themselves opposed to the project at all costs.

The agitation against the factory — The plot on which the plant is located is partly in Cortalim village and partly in Sancoale. Apart from these two villages, the village panchayat areas of Velsao, Cansaulim, Arossim, Verna and Nagoa also fall in the vicinity of the plant. Villagers from all these places got together to oppose the plant. As news about the factory first began to circulate, the Anti-Meta Strips Citizens' Action Committee (AMCAC) was formed in February 1999. The first formal AMCAC meeting was held in March near the Cortalim panchayat. In May, 1999, the Cortalim Panchayat passed a resolution asking that the license issued to the project be revoked.

The villagers thereafter organised several massive public protests against the project. Prominent activists from all over the State allied themselves with the movement. During President's rule, a huge *marcha* was taken to the Governor's office, where he was given data regarding the project. The agitation was faced with intense political instability. The Luizinho Faleiro government collapsed twice. Apart from a 3,000-strong protest at the state capital, Panjim, regular demonstrations, *dharnas* and



Local women protest against the proposed plant



Crowds attending an Anti-Meta Strips Meeting in Margao



Police repression has been a part of the Anti-Meta Strips agitation

hunger strikes were organised in the villages around the plant. Processions were taken out to the residences of Luizinho Faleiro and Alexio Sequeira, Ministers who were seen as backing the project to the hilt. In September, a mock funeral was conducted with two coffins—one for the owners and management of the plant and one for a government that backed the owners against the wishes of the villagers.

The Faleiro government had been markedly pro-Meta Strips and it hardly came as a surprise when massive state repression was unleashed against the villagers. They were prevented from approaching the plant and many of their protests like a *rasta roko* on the National Highway near Verna were broken up and demonstrators arrested.

The peak of repression came in September 1999. The Vasco Addl. Sr. Div. Judge, D.D. Dhumasker issued summons to the villagers in a case which sought a prohibition of anybody from approaching within 50

metres of the project site. Almost 2000 villagers turned up at the court premises on September 7th. The police made a lathi-charge in which at least 16 persons were badly beaten.

The Luizinho Faleiro government first set up an expert committee which included the director of the Goa Foundation. The committee did not sit even once during the its one month tenure. The government next set up a commission under a retired High Court judge, Justice Sindkar. This commission was stillborn, as the new government headed by Francisco Sardinha promptly disbanded it.

Meta Strips now moved the High Court for getting electricity and water supplies. AMCAC was also made a respondent. The Court however dismissed the petition, on the grounds that the government had filed an affidavit conceding that the agitators had raised several significant environmental issues which needed to be examined. Subsequently, however, the SPCB and the Inspectorate of Factories and Boilers quietly granted permissions to the unit to start production!

Quite furious now, the agitators blocked the National Highway in April 2000. A few buses were burned. In the melee, a policeman was seriously injured and later died in hospital. Several activists were also injured in the police firing, and some of them were permanently disabled as a result. The leaders of AMCAC went on a hunger strike. As the tension steadily increased in Panjim, the government finally relented and on 6.4.2000 ordered Meta Strips to suspend further work at their site till the entire project was examined by an Expert Committee. The Expert Committee comprised four scientists from CSIR laboratories, and was headed by B.B. Dhar.

Meta Strips, however, rushed to the Supreme Court and obtained a stay of the closure order in May 2000. In July 2000, the High Court admitted a 500-page petition filed by the Goa Foundation challenging on various grounds all the permissions granted for the project. The petition is pending final hearing.

The Dhar committee submitted its report in July, 2000. While it confirmed that the fears expressed by the agitators were not unfounded, it did not recommend closure of the plant. It insisted, however, on stringent monitoring of the unit, on the ground that emissions could contain hazardous metals. The SPCB, which had been the target of scathing criticism by the expert committee, refused to enforce the committee's recommendations.

Hazardous wastes clandestinely dumped by units in Colvale



Meta Strips subsequently withdrew the petition filed in the Supreme Court in January 2001, a day after the Goa government, now headed by Manohar Parrikar, withdrew the closure order of April 2000. (Parrikar had himself publicly opposed the operation of the plant unless the stripping of PVC coated copper cables was being done outside the state.)

Till December 2000, eight months after the Supreme Court intervened, the company had been able to produce only 18 miserable tonnes of brass strip out of a projected total of 3,000 tonnes per month. The plant managers claim the plant is now in full operation. However, this cannot be correct since the power and water consumption of the unit is not even 10% of the quantities sought when they first submitted their proposals.

The more important question, however, is whether the agitation has succeeded in its objectives. The reader may make his or her own opinion on the basis of the following facts:

- The company has been unable to import its raw materials from abroad due to import restrictions laid down under the new Hazardous Waste Rules, 1989/2000.
- Faced with uncompromising opposition to its request for 4 million litres of water per day, even from the High Court, the company was compelled to invest huge amounts in constructing water harvesting tanks. This is the first company that has been forced to do this in the state. Now other large water consumers like the Zuari Industries Limited and the Reliance-Salgaoncar Power Plant should also be compelled to do likewise.
- Faced with the prospect of immediate closure if there were even outward signs of polluting emissions, the company belatedly invested in expensive pollution control technology that would, according to it, trap and prevent zinc oxides and other metallic fumes from escaping through the stacks.
- The company itself claimed in courts that it had lost a whopping Rs 40 crores on delayed production, due to its initial mistake of locating its unit in an environmentally conscious state like Goa.
- The desperation of the company can be gauged from the fact that it tried to file several damage recovery suits and criminal complaints against the agitators in Bangalore, Hissar, Mumbai and Delhi courts. The Supreme Court has stayed almost all these cases after the agitators moved it through a batch of transfer petitions.

Industrial Waste

The Colvale Jagrut Manch found more than 18 sites in the village of Colvale containing industrial wastes and hazardous ash from burnt industrial wastes. The waste came from industries located in nearby industrial estates, but some even came from units located in the Verna electronic estate.

The State of Goa has not bothered to set up a facility for receiving industrial waste, whether of hazardous nature or not. The Pollution Control Board is not convinced that the State's industries generate hazardous wastes in such quantities that would require a landfill. But then, what about the Colvale dumps?

Nadora Citizens v/s Industrial Estate

Just as the villagers of Querim were successful in blocking the proposed Du Pont Nylon 6,6 plant, the villagers of Nadora protested successfully against the proposed Nadora industrial estate. Learning from the experiences of earlier struggles against ill-advised industrial development, the Nadora villagers planned their strategies effectively and well.

Despite the abject failure of many of the industrial estates and the myriad problems caused by them, the government has gone on approving industrial estates that have inevitably degenerated into environmental horrors and financial scams. In addition to the industrial estates already proposed in the Regional Plan, the Government has shown no compunction whatsoever in declaring new estates, irrespective of feasibility or need. The opportunities for loot provided by such projects are the main source of sustenance for our ruling classes.

The villagers of Nadora are surrounded by a green belt, planted to trees by the Forest Department several decades ago. So they were shocked to learn that the government had issued a gazette

This flurry of activity ensured that every possible avenue to voice opposition to the project was explored.

The Forest Department (headed by Richard D'Souza) finally sealed the fate of the project by asking the Ministry of Environment and Forests to advise it on whether the social forest involved could be destroyed without recourse to the provisions of the Forest Conservation Act, 1980. In August, 1999 the Bangalore Regional Office of the Ministry of Environment and Forests wrote to Mr. D'Souza informing him 'that the area in question is planted by Forest Department and presently well stocked.' Therefore, he stated, the plantation area comprising 31.08 hectares attracted the provisions of the Forest Conservation Act, 1980, keeping in view the judgement of the Supreme Court dated 12.12.96 and judgement of the Bombay High Court in Writ Petition No.273/1997 (Goa Foundation v/s Conservator of Forests and ors.). The area in question, he concluded, could not be converted into an industrial estate without prior approval of the Government of India.

ment thereafter issued the formal notification withdrawing its earlier notice for acquiring the land.

The villagers of Nadora are jubilant. They have won against a powerful clique of politicians who specialise in creating such industrial estates and then hocking off the plots to the highest bidders from outside the state.

But complacency would be misplaced. Opportunities to make a quick buck will not be foregone so easily. After issuing a notification declaring it had given up the land acquisition, the proposal for the Industrial Estate once again mysteriously reappeared on the IDC's agenda. As they say, you can't teach an old dog new tricks. The lesson from earlier struggles is applicable here: citizens cannot afford to relax their vigilance. Once they do that, loopholes will be found and the appropriate authorities influenced to give a decision in favour of the project. The people of Nadora are watching with a keen eye to see how the scenario unfolds. But for now, it's the IDC that is nursing a bloody nose.

Those promoting the industrial estate attempted to burn down the forest



notification on 19.1.1999 declaring its intention to acquire 7 lakh sq m of land comprising the very same social forestry plots and to convert these into an industrial estate after murdering all the trees.

The villagers moved fast. Led by Prof. Surendra K Gauns, they filed detailed objections before the Land Acquisition Officer and brought the Supreme Court judgement prohibiting conversion of forests to non-forestry uses to his notice. They got resolutions rejecting the proposed land use passed in the village Panchayat. They agitated before the Governor. They moved the Forest Department. They kept up the pressure, meeting as many groups and bureaucrats as possible.

The contents of this letter from Bangalore were communicated by the Conservator of Forests to the General Manager of the Goa Industrial Development Corporation. With this categorical opinion, the land acquisition proceedings were automatically rendered worthless. Richard D'Souza communicated this decision to the Nadora Citizens Committee in December 1999.

While this was going on, persons behind the proposed land acquisition attempted to set the social forest on fire in order to destroy it completely.

Seeing the obstacles and legal hurdles, the IDC finally passed a formal resolution abandoning the plans for the industrial estate. The Govern-

Impala Distillery Relocated

The relocation of the polluting Impala distillery located in village Orlim, Salcete is one of the lesser known stories of environmental activism.

Over the past several years, the factory run by former MLA Francisco Monte Cruz, had become the major source of public nuisance in the area affecting the environment and health of people. The history of the agitation to force the authorities to stop the distillery from destroying the environment is an extraordinary illustration of how alert villagers maintained a continuous and sustained pressure on the authorities even when they found the latter in complete collusion with Mr. Monte Cruz's criminal actions.

Ever since the unit commenced operations in the mid-80s, it became quite a nuisance. The water in the surrounding ponds and rice fields was soon contaminated and foul smell from the factory continuously disturbed people in the neighbourhood. The villagers complained year after year.

In November 1991, 67 villagers signed a common letter to the panchayat informing it that Impala Distilleries continued to discharge its pollutants on the surrounding paddy fields and lakes and that this had led to the proliferation of mosquitoes on a large scale.

In September, a huge explosion on the factory premises destroyed a water pump and damaged property worth Rs 10,000. By 1993, the villagers with the help of the Orlim Nagrik Samiti decided to renew the agitation to stop the plant and to have it relocate elsewhere. The request for relocation was made by the panchayat itself. Eventually, the unit was dismantled and relocated to an industrial estate.

INDUSTRIAL ESTATES: LITTLE MONSTERS

The Regional Plan for Goa does not make any assessment of the social, ecological and environmental impact of locating industrial estates on the plateaus. (No ecologists or environmentalists were associated with the preparation of the Plan.) It acknowledges that industrial activities in some of these areas being close to rivers and water bodies, they could very well lead to the degradation of the latter. It should also be noted that a large number of the entrepreneurs who will be accommodated in these estates are bound to be investors from other parts of the country and not Goans themselves. Therefore they may not be sufficiently sensitive to environmental issues pertaining to Goa.

The Regional Plan 2001 proposed a total of 17 industrial locations, most of them in the midland region. These are in addition to the development of the electronic city at Verna plateau and the new industrial estate at Pilerne. A cautionary note is required with regard to the electronic city at Verna.

It is a popular myth among planners and bureaucrats that electronics is a non-polluting industry. Silicon valley, the original centre of the electronic revolution in the USA, has today the most polluted groundwater terrain in that part of the United States. The solvents and other chemicals used in the electronic industry are highly toxic to both human beings and the natural environment. The Department of Science, Technology and Environment

would do well to prepare a realistic investigation of the environmental hazards of the electronic city, so that those responsible do not wake up to this problems too late in the day.

The other industrial estates and their locations are as follows:

1. *Tuem*: Three kilometres from Pernem town. Has a plateau on which Hindustan Antibiotics has already set up a plant. Most effluent discharge from any industrial estate on the Tuem plateau will be destined for the Colvale river.

2. *Macasana*: Eight kilometres from Mapusa, on the Macasana plateau. Possible target of effluent discharge: Colvale river.

3. *Dumacem*: A very large plateau on the southern bank of the Chapora river—Bicholim taluka. At present, there only exists a road metal industry. The Regional Plan has proposed cashew nut processing, explosives, cement pipes and other industries for the area.

4. *Tivim*: On the Mapusa-Colvale road. An industrial estate has already come up in the area and further expansion is proposed.

5. *Bicholim*: An industrial estate is already up and it is proposed to extend the estate towards south and east. Untreated effluents, if discharged directly to the river, will create enormous problems as the sweet water stream is the main source of water supply.

6. *Onda*: A sizeable area was acquired for a major automobile component industrial unit in association with

Functioning of Industrial Units

Estate	Units in Production	Units Closed	Units to be Started
Onda	29	7	9
Corlim	64	30	—
Canacona	22	3	5
Sancoale	89	41	19
Tivim	54	95	7
Kakoda	29	14	11
Verna	117	—	—
Beinora	74	13	—
Pilerne	12	—	53
Kundaim	136	22	—
Cuncolim	31	—	48
Bicholim	63	24	4
Margao	78	23	—
Madkai	39	—	—
Tuem	16	7	17
Mapusa	28	3	—



Industrial Estates in Goa

Estates proposed in Reg. Plan 2001 & developed	Estates proposed in Reg. Plan 2001 & yet to be developed
Tuem	Macasana
Tivim	Dumacem
Bicholim	Onda Madkai
Usgao Tisk	Bethora
Panchawadi	Kakoda Assolda-Xeldem
Sao Jose De Areal (Margao)	Cuncolim
Verna EPZ	Sanguem
Calem	
Additional sites proposed & developed	Additional sites proposed & yet to be developed
Colvale	Keri
Corlim	Latambarcem
Pilerne	Laddphe
Mapusa	Bordem
Kundaim	Raia
Onda	Sal, Dhargal
	Pissurlem
	Bhuimpal
	Shiroda, Pilerne
	Salvador De Mundo
	Poinguinim
	Pernem Growth Centre
	Sancoale
	Canacona

REGIONAL PLAN FOR GOA

Industrial Locations 2001

the Tatas. Environmental impact of the unit is unknown.

7. *Usgao Tisk*: The Goa Meat Complex and the pharmaceuticals unit of Merck and Company have already been set up in this area. Environmental hazards generated by both units are unknown.

8. *Madkai*: On the road from Mardol to Madkai, a vast rocky terrain partly occupied by *morod* fields has been proposed for an industrial estate. The Regional Plan states that another site in Madkai is also available 'even for marginally pollutant units'. The main reason being that it is located on the Zuari river, close to the Cumbarjua canal, into which it will be fairly easy to dump effluents.

It should be noted that the Cumbarjua canal is one of the principal habitats of two species of crocodiles in the state of Goa.

9. *Bethora*: Very close to Ponda town, with its local drainage towards the Zuari river. Though the Regional Plan recommends 'that no untreated effluents should be disposed off in the lower riparian areas', it proceeds to suggest that distilleries and industries producing chemical compounds (both habitual polluters) can be set up in the area.

10. *Panchawadi*: Located at the border of Panchawadi and Sanvordem. The land presently has shrub vegetation and cashew groves. The only unit is a tile factory.

11. *Cacora*: Located between Sanvordem and Sanguem towns. The industrial estate has already come up.

12. *Assolda-Xeldem*: The site is very close to the existing railway line near Curchorem. It is partly occupied by *morod* fields and scrublands. Says the Regional Plan: 'Due to the existence of the saline creek, it is suitable for polluting industries as well.' Most entrepreneurs undoubtedly welcome this open invitation to discharge their untreated effluents.

13. *St. Jose de Areal*: With one already existing industrial estate, a sizeable area has now been earmarked for establishing a separate estate. The entire area already has an industrial character with large variety of industries including chemicals and plastics. The effluent record of the existing estates is still to be assessed.

14. *Cuncolim*: A small rocky area south of the Quepem-Cuncolim road and bounded on the southern portion by the Selaulim irrigation canal. The Regional Plan acknowledges that 'no pollutant industries should be permitted in this area and that the disposal of the effluent should be strictly controlled and monitored.' Today, the industrial

estate has most of the noxious and polluting units unwanted by other States, particularly metallurgical (including heavy metal) industries.

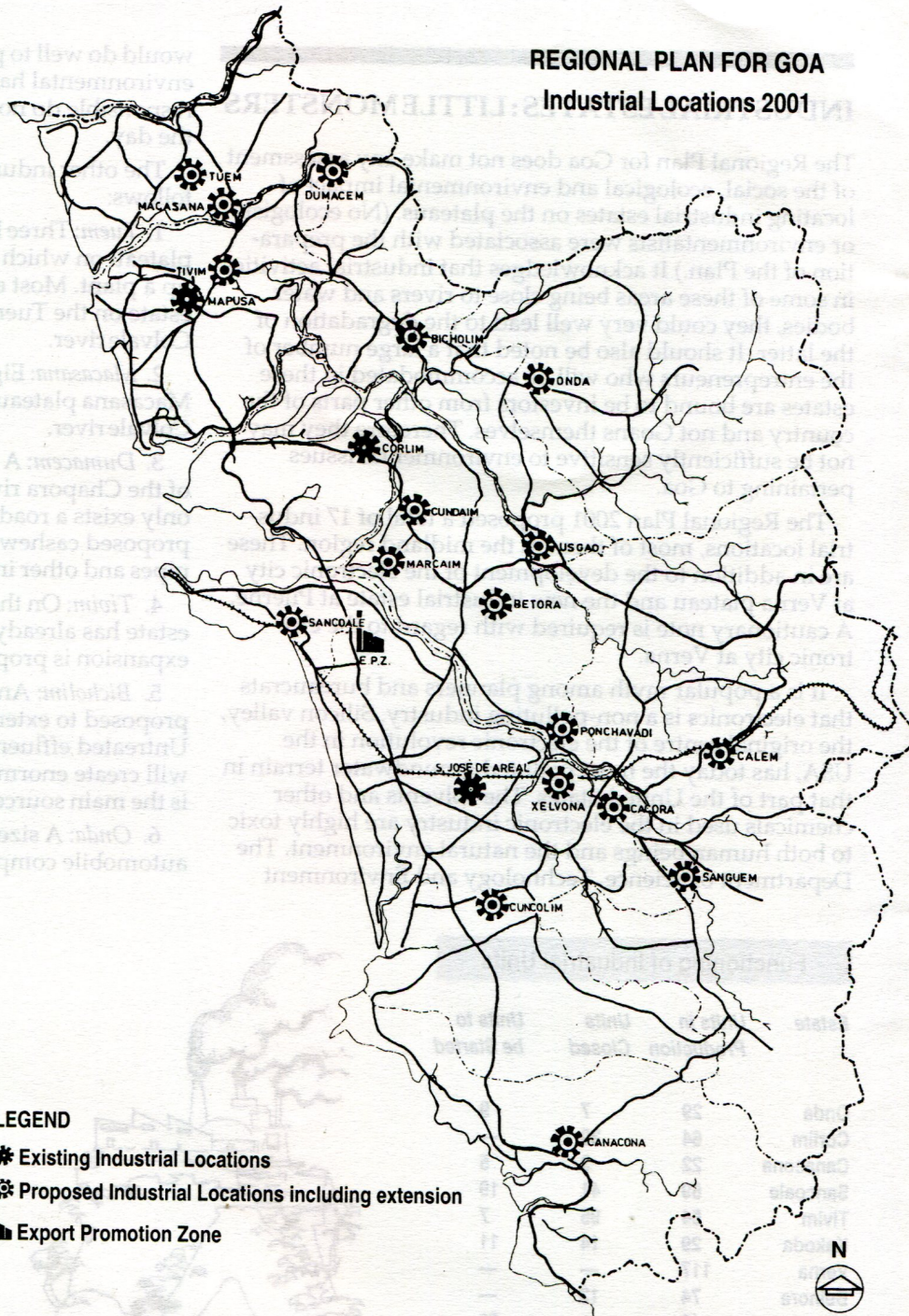
The new industrial estate at Sancoale in which Meta Strips is now located is an illuminating example of how the Government of Goa creates industrial estates.

The unit was first approved for the Verna Industrial estate. Pharmaceutical units voiced their objections to a scrap processing unit in their midst. Overnight, the promoters were invited to look elsewhere. They went further down the road, saw the empty plateau at Cortalim and asked the Government for it.

Since there is a legal bar for companies acquiring land under the Land Acquisition Act, the Government

LEGEND

- ✱ Existing Industrial Locations
- ✱ Proposed Industrial Locations including extension
- ▣ Export Promotion Zone



declared that it was acquiring the land for an industrial estate. No studies were conducted to assess the suitability of the site for the proposed unit. No objections were invited. The Member-Secretary of the State Pollution Control Board visited the plot one morning for a few minutes and approved the site as well.

Once the plot was acquired for a pittance, the IDC handed over the land for a nominal lease rent to Meta Strips to locate their unit (*full story on Meta Strips can be found elsewhere in this chapter*).

This is how Government decides the location of industrial units and estates in the State of Goa!

In the meanwhile, a High Powered Committee headed by Prof. M G K Menon appointed by the Supreme Court of India has submitted a report in which recommendations have been made relating to the establishment of industrial estates. Regarding the location of such estates, the High Powered Committee has observed:

‘Aggravating the situation is the tendency of politicians, bureaucrats and others in positions of power to locate industries in areas which are expedient to them. Industries and industrial estates, where hazardous waste may be generated, are also located keeping in mind availability of certain infrastructure services such as roads, power, water etc. without taking into account environmental aspects. Worse, the locations may even be contrary to established land use, or conflict with established ecological criteria. The country, in fact, is paying the price for location of hazardous industries in ecologically sensitive areas and sometimes within the bounds of residential areas. Such arbitrariness in siting decisions, which will have major consequences on the lives and livelihoods of people in neighbouring communities, must never be allowed.

‘In addition to infrastructure and environmental needs, State Governments must keep in mind proximity to disposal sites and centralized treatment facilities when considering location of industrial estates. The latter should be separated clearly from residential areas. Strict criteria should in fact be established which require them to be located in specially designated areas in the State’s statutory land use plan (which in most States has to be submitted to the public for objections and suggestions).’

We hope that the authorities in question will listen to sane and sage advice and spare the Goan public from repeated intrusions into their peaceful existence with such absurd proposals.

LOCAL BODIES AND INDUSTRIAL PROJECTS

The agitation against Meta Strips brings into sharp focus one of the most contentious issues in industrial development: industry siting.

Conflicts over this issue have been going on all over the country for decades. Goa too is no stranger to this conflict. The early industries in Goa like Zuari and Ciba-Geigy (now Syngenta) did not meet with significant local opposition in the initial stages as the people were largely ignorant of the likely impact. Protest began to build up only after the factories were functioning and the local people started experiencing the ill-effects. But some things have changed for the better in the last 30 years or so. Public

awareness has grown exponentially, industry and government have been forced to become more transparent and accountable.

Thus, when Du Pont tried to set up its Nylon 6,6 plant, they were met by determined opposition from the local people. Information on the environmental impact of the proposed plant was unearthed by public-spirited individuals and NGOs. After a protracted struggle, the will of the local people prevailed.

In the case of Meta Strips, various defences were made by the company, chief among them being that the people’s concern over pollution was misplaced. But the defence failed to convince the locals who distrust large companies any day.

This brings us to the crux of the issue: in the final analysis, whose will is it that must prevail—that of the local people or that of the project proponents and their backers in the government?

It is a basic norm accepted all over the industrially-developed world that the local population has the right to veto the location of a particular industry in its midst. Only in relatively less industrialised countries like India does one see a situation where industries are located against the express wishes of the local affected population. When necessary, considerations of national interest are invoked—more often, siting is done with arrogance and inherent contempt for the local people.

But local self-government bodies like panchayats must have some say in the matter. This is after all the crux of the 73rd Constitutional Amendment. In Querim, the Panchayat’s opposition could not be entirely disregarded. In the case of Meta Strips, the Panchayats have not been able to enforce their decisions or resolutions. This can only undermine Panchayati Raj and the explicit mandate of the Indian Parliament.

Attempts to further subvert this process are already on. Through a proclamation (No.15/14/92 IND-IDC dated 7.1.2000) couched in the usual bureaucratese, the Goa Government proposed to take away the powers of local authorities by declaring ‘that the provisions of any law relating to local authorities providing for control or erection of buildings ... shall cease to apply’ in the industrial areas listed in the schedule to the proclamation. These will become notified areas under the direct control of the IDC.

No. 21 of the schedule is the Sancoale and Cortalim industrial estate where the Meta Strips plant is located.

This proposal must be opposed at all costs. (The High Court has already admitted a petition challenging the notification.) It will take away in one fell swoop whatever space the law allows to local people to oppose such decisions. After this, the only recourse is to take to the streets. Maybe that is what the government wants—it has often shown its willingness to unleash repression if people dare to agitate about such issues.

There will be those who will try to justify such measures. The arguments are not new—‘national interest’, ‘it has to be manufactured somewhere’, ‘industrial development at all costs’, ‘local people will benefit’ etc. Most of these arguments do not hold water—in case they do, it is up to the project proponents to convince the people of their veracity. In case they can, good for them. But finally, it is the will of the people that must prevail.

The Sanjivani Sugar Factory

The Sanjivani sugar factory is located at Ponda Taluka, around two km from Tisk. The company was registered in 1971, and by 1974, the company began the production of sugar from cane. The sugar factory is located just upstream of the Khandepar river, one of the most important water supply sources in Goa. The factory is managed by a three member Board of Administrators nominated by the Government of Goa.

The factory operates only during the November-March period, when the sugarcane matures. During the remaining months of the year, the factory is idle and its machinery is dismantled.

It employs a staff of 200 persons who are permanent, besides 150 seasonal workers. During the sugar production period, this figure swells to 600.

At present the factory processes around 93,000 to 1,03,000 tonnes of cane, out of which around 75,000 tonnes are locally grown cane and 25,000 tonnes are bought from the neighbouring states. This factory has incurred heavy losses since its inauguration and it is heavily subsidised by the government. It pays around Rs 325 per tonne for cane which is cut, harvested and transported to the factory, and Rs 265 per tonne for cane ex-field.

The water requirements of the factory are met from the Khandepar river. No details were available however as to the quantum of water required for production.

Originally, a tank with a capacity to store 1500 tonnes of molasses was built. In 1978 the company processed an additional 25,000 tonnes of cane, leading to an excess of molasses production. The captive tank was too small to contain all the molasses produced.

One of the important conditions of consent given by the Central Pollution Control Board was that the molasses produced in the factory should be col-

lected and stored in absolutely waterproof, lined (masonry, RCC or steel) tanks. In flagrant violation of this condition, the factory began to store 1320 tonnes of molasses in unlined lateritic soil pits and 1128 tonnes within natural drains. The factory failed to lift the molasses despite warnings by the PWD in the middle of May 1978 and the visit of a Central Board official on May 14, 1978, to impress upon them the gravity of the situation in view of the imminent monsoon. That year, the monsoons arrived early, on May 26, 1978 predictably. The incessant heavy rains carried along with the runoff, all the molasses from the natural drain and in addition increased the seepage of the molasses from the unlined pit into the Khandepar river.

This resulted in a drastic depletion of the dissolved oxygen level in the river water, soon evidenced by the large number of dead fish seen floating along the river. With the molasses, experts also found abundant E-coli bacteria. This came from the excreta of labour colonies who had used the open countryside around the factory as a lavatory. The molasses and E-coli contaminated water was drawn up by the pumps of the Opa Water Works.

In Margao and other areas receiving water from the river through the Opa works, the population opened taps in shock and disbelief, as the obnoxious smell and colour of the water assailed their senses.

The public outcry was spontaneous.

On June 3, 1978, the government decided to close the water works for a period of 30 hours to flush out the molasses. The Central Board obtained an injunction from the court restraining the factory from polluting the river and the court issued a directive to the factory to take steps to dispose off the molasses under direction of the Central Board.

Meanwhile, various measures adopted to eliminate the pollution had little success as the entire

distribution system had to be flushed out. A large number of cases of jaundice and other ailments were reported. To alleviate the consumers' hardships, the PWD supplied water in tankers to a number of settlements.

Finally, the bulk of the molasses was disposed off near the mouth of the Mandovi river and some quantity was also discharged into a tributary of the Paroda river. This work of disposal was completed by June 17, 1978.

The factory has since constructed a 3500 tonnes capacity steel tank for storage of molasses to minimise the risk of any further river pollution.

The episode underscores the need for vigilance by concerned citizens and institutions, particularly because the location of the factory renders the major source of Goa's water supply highly vulnerable.

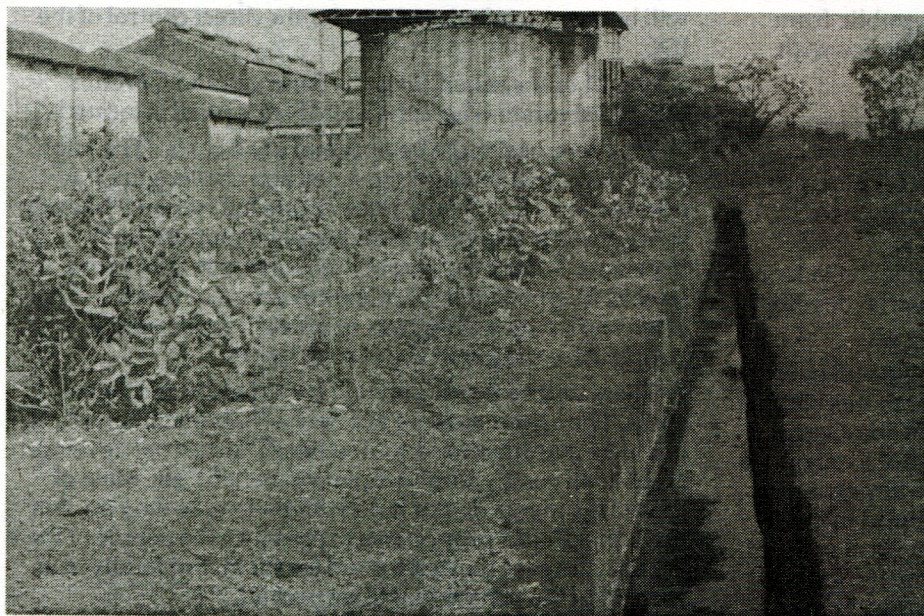
The factory has since installed a comprehensive two stage plant for treating its effluents. Though the plant is appropriately designed, the level of effluent treatment is not satisfactory because of poor operation and maintenance. The major pollutant discharged is organic oxygen with a high Biological Oxygen Demand (BOD) and solids.

Who was responsible for the unfortunate location of the Sanjivani Sugar Factory in the vicinity of a *nallah* connected to Opa/Khandepar river? The environment disaster of 1978 could have been avoided by locating all industries far downstream and not within the catchment area of the State's pristine water supply.

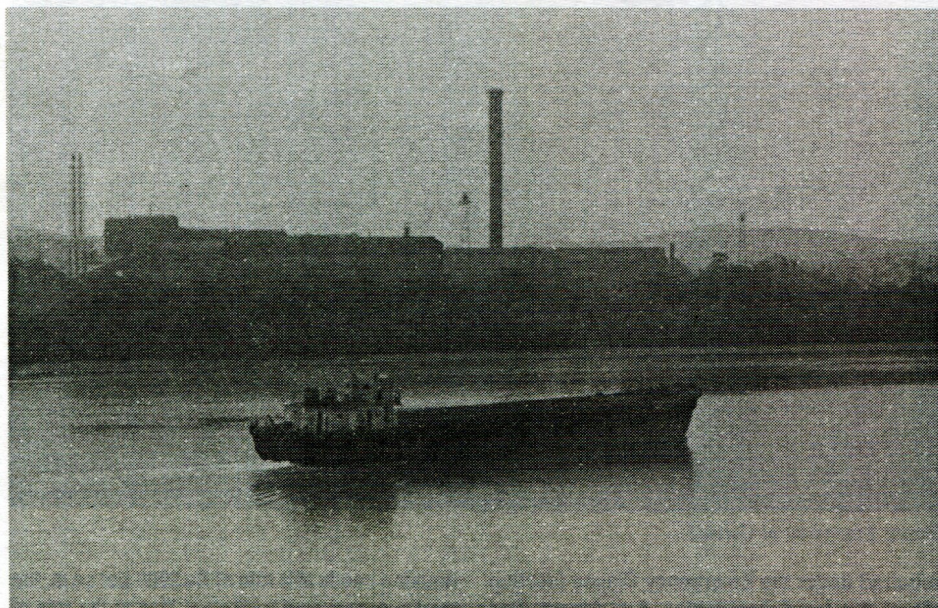
The sugar factory has never been able to break even and has continuously run at a loss. The most recent attempt to make further bad business out of a bad bargain was a recent proposal from the Karnataka Government that it would supply the factory enough sugarcane to remain in production throughout the year and make profits, provided the Goa Government relented on the scheme to divert water from the Madei to the Malaprabha reservoir. In order to keep an economically unviable plant going, the proposal is to destroy ecology somewhere else. These politicians really need to have their heads examined.

Despite all this, even today, siting of industrial units is approved by unqualified persons, mostly Ministers. It is ultimately the industrialist who decides where he wants to locate his factory and provided the price is right, every authority from the Minister to the Pollution Control Board will grant him an NOC and even use the provisions of the Land Acquisition Act to acquire the land forcibly from the land owners for him. There are any number of provisions in existing laws that require the authorities to examine a proposed site is suitable, prior to granting NOCs. Till today, such provisions have never been used simply because politicians feel they are entirely unnecessary and bureaucrats feel they are a pure formality, Parliament's wisdom be damned.

Effluent drain from Sanjivani Sugar Factory in April two months after factory closure



Mandovi Pellets at Shiroda



The Mandovi Pellets plant at Shiroda behind mangroves.

The Chowgules had been thinking of a pelletisation plant for a long while, but construction on Mandovi Pellets began in 1975. The Japanese helped by loaning an advance of 15 million dollars, and also signing up to receive the first ten years' production of iron ore pellets. The problem was finding a proper place for the plant, accessible to the mines, and also accessible to barges that would carry the pellets to Mormugao harbour. The place they ultimately chose was one of the most beautiful valleys in Goa, in the middle of Shiroda's fields.

The cost of the plant was Rs 48 crores, and it had a capacity of 1.8 million tonnes. The iron ore would be ground and washed (to remove clays) at the mines, and the resultant product (an iron ore concentrate) transported to the plant in trucks. At Shiroda, the ore would be mixed with Bentonite and limestone and put on pelletizing discs. The 12 mm pellets would then be heat hardened, piled onto barges and transported to the river. The fully automated factory employed 350 people at the start.

Mandovi Pellets was scheduled to come up on prime agricultural land, on which sixteen agricultural tenants worked for a living. The people naturally revolted. Also the fear of pollution from heat and dust was fresh in their minds—the Zuari Agro Chemical factory's pollution trouble in Sancoale had just been resolved after two years of criminal neglect. Those who owned the surrounding lands feared for themselves more than those on whose land the factory was originally planned: they would have to live with obnoxious pollution all their lives.

Manoel Gomes still remembers the movement he led against the factory coming there. And the women have not forgotten spending fifteen days in the Fort Aguada jail. The Chowgules, like the Birlas, got all the police they wished for. The local Congress party that had supported the movement, later dropped out on orders from

D.K. Borooah, who had had a private visit from Mr. V.D. Chowgule himself. The agitating people were called together, and leaders who once predicted death if the factory were allowed to come up, now claimed it would be all right.

The case against the industrial complex coming up on agricultural land was sought to be undermined by bringing in experts to evaluate the productive worth of the land at harvesting time.

The villagers who took part in the agitation to stop the factory were discriminated against where jobs were concerned. Even those employed were treated rudely and none got permanent status.

But the real damage to agriculture began later: when the factory began operations, dust and other materials settled on the land. By May 25, 1978, farmers felt constrained to inform the engineer in charge that the piling up of mud in certain areas had begun to lead to the flooding of their fields. The usual trick was to get every farmer eventually disgusted enough to sell. Chowgule was ever willing to buy.

Mandovi Pellets was jointly sponsored by Chowgules and SAIL, but the public issue was undersubscribed, indicating traditional distrust of an enterprise so totally under the control of the Chowgule family. The factory was not part of the industrialisation of India, much less of Goa: it was merely one more element in a chain of lasting dependence on outside demand. The losers were again the powerless people of Shiroda and Vajem, Goan agriculture and a virgin landscape.

Manoel Gomes spoke in proverbs: 'Now we are like the seed which a gardener planted from a packet which had no label; he does not know what will come out of it. I do not know what is the future of our village people.'

Two years after it began operations, Mandovi Pellets closed down. It reopened again later, but sits like a dinosaur on the horizon.

Cuncolim Industrial Estate

A number of metallurgical units have been set up at the Cuncolim Industrial Estate. Serious questions have been raised over the years regarding the safety precautions, excessive power consumption and pollution caused by these units. A dissertation, 'Environmental Management at Cuncolim Industrial Estate—Metallurgical Industries' by Nita D'Silva written under the auspices of the Institute of Safety, Occupational Health & Environment discusses some of the problems.

'The Cuncolim Industrial Estate has provision for 109 units, of which only 38 are functional and the remaining have not started. There are 13 metallurgical units.

'The safety measures taken inside the metallurgical units are not satisfactory. Workers are seen working in the units without any Personal Protective Equipments. This is not in compliance with Sec. 35 of the Factories Act. Metallurgical units use a furnace for melting of scrap which is then poured in ingot moulds. Workers working with the furnace are provided with only a fan for cooling the temperature and there are chances of workers falling into the furnace as the openings of the furnace do not have any surrounding rails. There has also been one death of a worker by electrocution from the cooling fan provided.

'The Cuncolim Industrial Estate violates environmental siting guidelines:

1. It is close to Cuncolim *nallah* which is a tributary of the river Sal.
2. NH 17 is 3 km away but the railway passes within 25 metres.
3. 3500 people stay near the industrial estate without a distance barrier.
4. There are no air quality monitoring stations.

'The solid wastes generated mainly in metallurgical industries are collected manually and dumped at the site in the industrial unit for some time and then finally disposed off in the quarries in the CIE. They are disposed of untreated, which is in violation of the Environment Protection Act, 1986.

'The emissions are allowed to pass through cyclone separators and wet scrubbers but the method used to collect the smoke is not proper as the funnel that is kept over does not stop all the smoke and most drifts away.

'Conditions under section 13 & 14 of Manufacture and Import of Hazardous Chemicals Rules, 1989 were not satisfied as on-site and off-site emergency plans were not made. Neighbouring people were unaware of the nature of hazardous chemicals. This is against section 15 of the Rules.'

The Cuncolim Industrial Estate is a major blot on Goa's environment. Since the unit is far from the office of the Goa Pollution Control Board, industrialists at the Estate work without any controls and with impunity. Though the IDC is required to set up green belts, it has done nothing of the kind either here or elsewhere.

Binani Zinc

Binani Zinc, a Kolkata based company, decided to set up a factory in Goa for the manufacture of glass fibre in collaboration with Bishop Technology Inc., a foreign company. It is revealing to see how the company set up its unit in Goa and was able to acquire land without any problem.

The company first identified Colvale as a suitable place for setting up its project and then submitted an application to the Pollution Control Board on 9.7.1993. NOC was granted by the Board on 10.1.1994. On 9.2.1994, the High Powered Coordination Committee (HPCC) approved the project subject to identification of land at Colvale. Binani Zinc also gave an undertaking to the HPCC that 100% jobs in the unskilled category and 90% of semi-skilled jobs would go to locals.

Binani commenced identifying the land in Colvale village on the plateau part of the village and then approached the Director of Industries to acquire the land from its owner, the Comunidade of Colvale. It also applied to the Town & Country Planning Board to approve the change in the use of the land from orchard to industrial purposes. Three months later, the Chief Town Planner approved and granted NOC for the change in land use. On 26.7.1994 Government decided to acquire 1,20,000 sq m for the project. IDC gazetted the land acquisition notice on 16.8.1994 and issued the final notice on 20.9.1994.

No objections were allowed as the land was



Binani Zinc plant at Colvale

acquired under the Emergency Clause (section 17) of the Land Acquisition Act. Binani Zinc thereafter started construction of the unit without permissions from the authorities and eventually managed to clear these as well. The villagers of Colvale could not 'do a Du Pont' on Binani Zinc simply because the panchayat allowed itself to be pressurised into granting the approvals.

The tragedy is that while the villagers of Colvale had requested the Comunidade of Colvale to sell them plots of the same land earlier for their

housing needs at a rate of Rs 200/- per sq m, the land was acquired by Binani Zinc at the rate of approx. Rs 22/- per sq m.

Today the company is operational, but has no place to dump its industrial waste. Part of the waste was dumped illegally in Pernem, while some of it was dumped in the Mapusa waste dump outside the Goa Housing Board. Now that the dumping has been stopped, we are not aware where the company's waste is going to, but it cannot be anywhere outside the State.

Penguin Alcohols

The Goa Foundation went to the High Court in 1995 because Penguin Alcohols, set up to produce un-denatured ethyl alcohol within the Canacona Industrial Estate at Shristhal, had begun to discharge polluting wastes in the surrounding environment.

The SPCB issued show cause notice for illegal discharge and carried out site inspection which established violations. Drinking wells were found to be smelling of jaggery. The newspapers re-

ported that the Karwar police had seized 2 tankers which had been trying to discharge wastes on the Karwar seashore. On 14.3.96 the Ribandar police arrested the drivers of the 2 trucks which were found to be discharging molasses into the Mandovi at Dhauji. The entire Pagi (fishing) community was enraged at the efforts of the company to lay down an illegal pipeline to discharge its problem wastes into the Talpona river.

On 3.9.1996 the Pollution Control Board directed

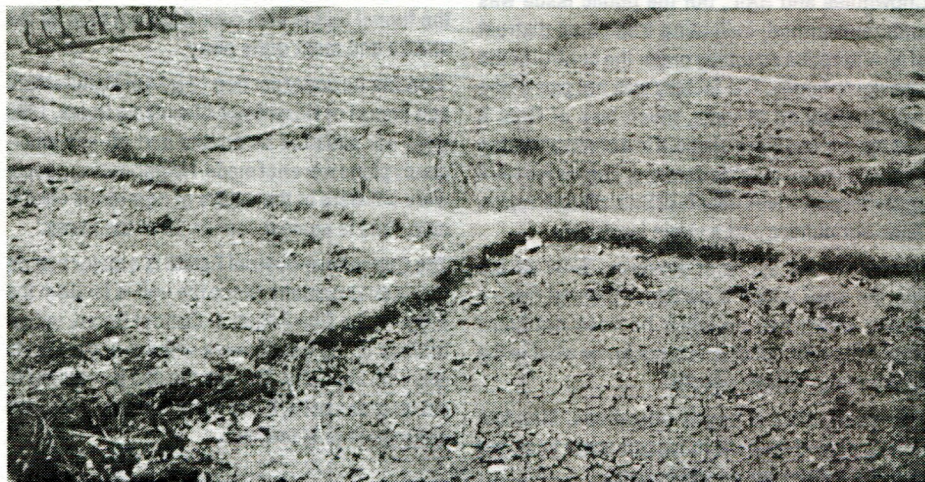
the unit to be shutdown. At the Pollution Control Board meeting on 25.9.1996, the Board asked the Company to respond to the 3 requirements laid out by its Technical Advisory Committee:

1. Disclose willingness of the farmers to switch over their cultivation to sugarcane in order to absorb the liquid effluents from the factory.
2. The necessity of providing water supply to the nearby residents depending upon wells as the same are likely to get polluted due to the use of effluents for irrigation by farmers.
3. Provide a security amount to restore the environment in case of irresponsible disposal of effluents.

What the Board was actually proposing was that it would consider authorising the unit provided the company would convince several farmers to change their cultivation practices to absorb the pollution load from the factory. No wonder in Goa, the pollution control body has been renamed the 'Goa Pollution Board'.

In the year 2001, a fresh agitation rose up against the company because of continuing environmental problems. Now it has shut down. How the unit could have been allowed into the state is surprising, considering the state's openly declared policy of not allowing polluting industries.

Paddy fields at Shristhal damaged by Penguin Alcohols effluents



Teksid Kalyani

Teksid Kalyani decided to set up a foundry for manufacturing gray and nodular iron castings for automobile components at Navelim, Sanquelim, Goa. The unit was scheduled to produce 41,000 tonnes at commencement, reaching 100,000 tonnes per annum in 2003.

As it was a foundry, a public notice was issued by the Pollution Board in September 1998 and the public hearing took place on 15.10.1998. During the hearings it became apparent that the unit would expropriate 1.1 million litres of water per day (of which 9,00,000 litres would evaporate by foundry operations) from the public river at Sanquelim. The foundry involves waste processes including the transport of molten iron at 1500 degrees from Amone over 3 km to the factory. The unit would generate solid wastes of upto 13,000 tonnes per months and would have 22 stacks for emissions and discharges. It would require 15 MW power for its operations.

The law requires that until an environment clearance is granted to such a project, no work should commence at the proposed site. Teksid Kalyani however decided to violate the environment law and were already constructing at the site when the public hearing took place. Though the Pollution Board asked the unit to stop work on 16.10.1998, the public hearing panel which visited the site on 2.11.1998 found that work was



Teksid Kalyani foundry plant stayed by High Court

continuing. This forced the Goa Foundation to file a petition and work was stopped by the High Court on 21.4.1998. Disposing of the petition, the Court recorded:

'Learned Government Advocate Shri C.A. Ferreira has stated before us that the concerned authorities including Panchayats and Municipal Authorities shall be instructed that in case of projects covered under the said Notification, no construction work, preliminary or otherwise, relating to the setting up of the project, shall be allowed to

be undertaken till the Environment and/or Site Clearance is obtained. According to him, these instructions shall be issued within a week.'

Interestingly, while the construction of the factory was stayed by the High Court due to violation of environment norms, the office of the Goa Foundation was visited by the Sarpanch of the village in which the plant was located and a few panch members as well. They came to impress on the Foundation that they wanted the factory and were willing to tolerate the pollution if it provided them jobs.

High Powered Committee on Hazardous Wastes set up by the Supreme Court, the State Pollution Control Board granted the unit an 'authorisation' to dispose of 1825 tonnes of residual hazardous waste containing water-soluble chemical compounds of lead, copper, zinc, chromium, nickel, selenium, barium and antimony. The Board agreed to the proposal of the company to have the waste sent to a brick manufacturer at Polem and for use as a soil filler for agriculture in Kolhapur.

Unofficially, large quantities of the waste were dumped by the unit in the industrial estate itself, in the quarries at Ambaulim and even along the roadsides in the Canacona forest. The unit was eventually shut down by the SPCB after it was taken up for investigation by the High Powered Committee. It was finally given permission to restart after it constructed a landfill facility in the adjoining plot within the industrial estate after the visit of a subcommittee of the SPCB.

The SPCB's sub-committee issued the clearance without a proper investigation of the company's clandestine operations. For example, it was not even aware that the unit had dumped large quantities of waste in the Ambaulim quarries.

Till today, the waste lies in the Ambaulim quarries despite all the country's laws and all the country's statutory authorities.

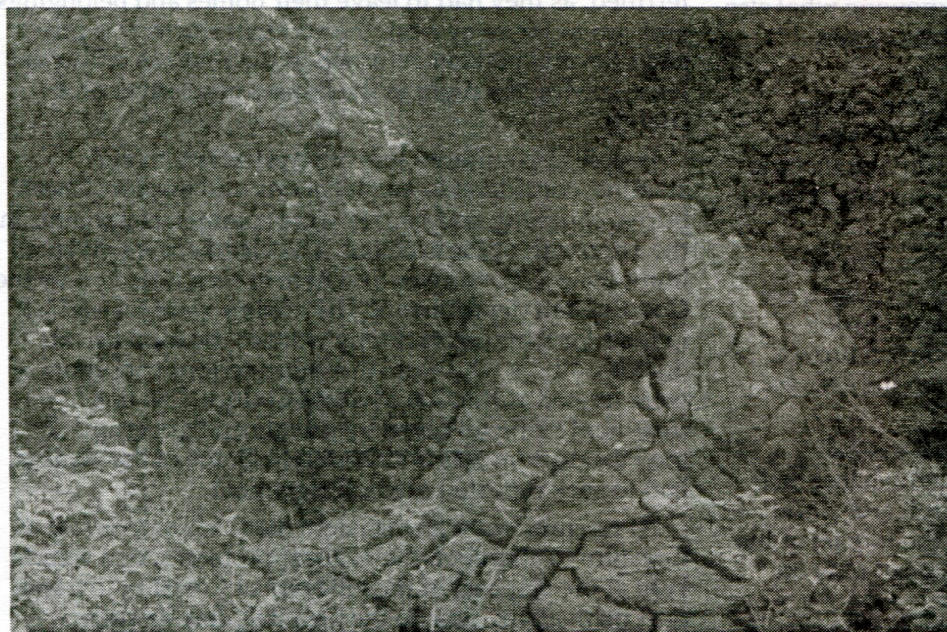
In the meanwhile, the Ministry of Environment and Forests has once again granted permission to the company to import hazardous wastes from abroad. The less said about that the better.

Sunrise Zinc

Sunrise Zinc was set up around 1996 to produce electrolytic zinc and copper, using brass ash as raw material. The process involves first leaching of zinc and copper bearing brass ash, separating the zinc and copper using a solvent extraction process and finally electro-winning of zinc and copper in separate cell houses. The capacity of

the unit is to produce 10 tonnes of electrolytic zinc and 2 tonnes of copper.

As the unit was importing potentially hazardous wastes, it ran into trouble after a blanket ban imposed by the Supreme Court on import of hazardous wastes in May 1997. The unit then switched over to locally available hazardous wastes which led to generation of large quantities of residual hazardous wastes after processing. On 1.4.1998 (a few days prior to the visit of the



Hazardous waste from Sunrise Zinc continues to lie in the quarries of neighbouring Ambaulim

PERILOUS TRANSPORTATION OF HAZARDOUS CHEMICALS

The pollution by industries producing toxic chemicals is not restricted to the factory and its environs. The place where the chemicals are used, does, of course, suffer from the ill effects; but even places along the transportation route are affected.

With lax laws and worse implementation, the transportation of hazardous chemicals is an activity fraught with danger. There are horrific incidents reported regularly from all over India, with considerable loss of life, injury and damage to property. Goa has not been spared from this bounty. Incidents of spillage of hazardous chemicals take place regularly; most go unreported and practically never is compensation paid.

In 1987, an expert committee went into these problems and observed:

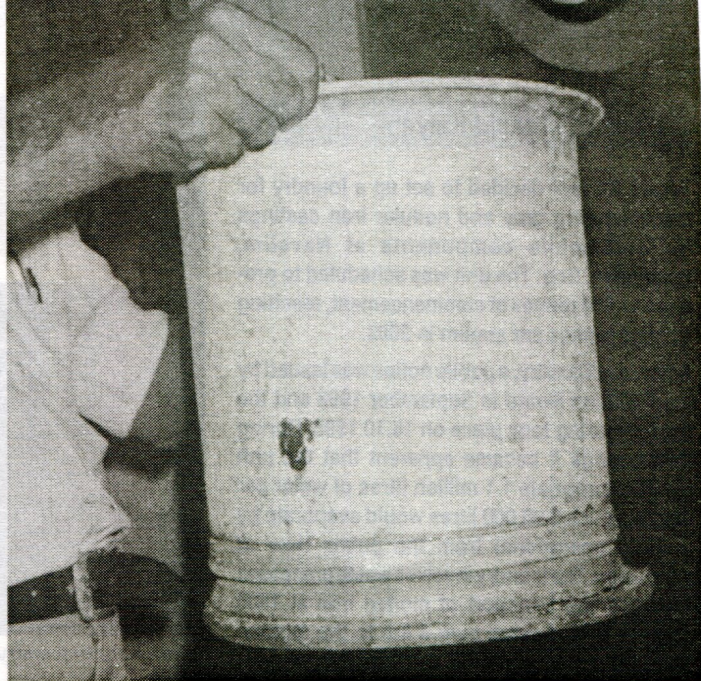
'There is an associated problem regarding the movement and collection of ammonia from ammonia carriers. These are mobile carriers which bring ammonia in tanker loads. The total quantity of ammonia received per day is about 120 tonnes. These tankers carry ammonia on uneven, narrow and curved roads in the territory of Goa. In case of any major accident, significant ammonia release can be envisaged. It can cause damage to the environment and the people living there. This needs looking into by the appropriate authorities of the Government.'

On the morning of November 1st, 1988, a truck carrying 6 one-tonne cylinders of liquid chlorine from the Ballarpur Industries Limited Plant at Binaga, near Karwar in Karnataka to the Hindustan Ciba-Geigy pesticides plant at Cortalim, Goa, met with an accident on the Cortalim slope and overturned at Sotrant, where it fell into a ditch alongside the road. Two cylinders developed leaks. One of them vented all its contents into the atmosphere. The effect on human beings and on the natural environment and even inanimate objects was instant. People within a radius of 300-500 metres immediately felt nausea, suffered vomiting, dizziness and difficulty in breathing. The entire atmosphere became clouded and people not knowing what else to do, simply fled from the site, leaving their homes unattended.

The health impact of chlorine inhalation in a large single dose is extremely severe and damaging to the human body, and can also be fatal. The impacts include damage to lungs and teeth, skin rashes, burning of eyes, irritation of eyes, nose and throat.

The effect of the gas leak on the environment was equally drastic. Most coconut trees in the vicinity were immediately killed. The leaves on trees and shrubs withered and fell off and grass turned reddish brown. There was a strong smell of chlorine gas in the area for days after.

Equally pronounced was the effect on household objects like brass pots and steel utensils which lost their colour and shine instantly and became dull and cloudy and almost unrecognisable. If this were the impact of the gas on metals, its impact on living tissues can only be imagined.



Brass vessel affected by chlorine gas

The truck transporting the 6 cylinders bore no indications of the hazardous nature of the goods it was carrying. The truck was without any safeguards. There were no markings on the containers, neither did the truck driver have any manual with him indicating the nature of the gas or the treatment to be followed in case of an accident. Since no one knew what had escaped into the atmosphere, far less the nature of the gas that escaped, and since the truck driver after shouting warning had fled the scene, there was no immediate action taken. People panicked, not knowing what to do. The fire brigade personnel who arrived at the scene themselves became victims as they inhaled the gas at close quarters. It was only when the fire brigade chief Mr. P.K. John identified the gas and its deadly nature became known, that the highway was sealed and the remaining people evacuated from the area. Mr. John stated later that inhalation of the gas for just 2 minutes can prove fatal to average adults.

Persons in the vicinity of the accident were put to great pain and hardship. For the first few hours they were terrified, as they had to leave their homes and belongings and run as far away from the accident site as was possible. Several persons returned to their homes only a day later, staying the night in the houses of relatives and friends.

People also suffered loss of physical health and stamina, considerable mental agony and tension. Chest burns, coughing and nausea were common complaints in the aftermath of the accident. The victims were given no immediate aid or advice or where to seek attention by the Government departments. The victims were instead left to fend for themselves. Many went to the local private doctors, others who were in a more serious condition were treated at the Goa Medical College. The line of treatment being followed by private and government medical doctors was not consistent. Some of the victims had to seek repeated medical treatment.

At no time was a government medical camp set up at Cortalim to attend on the victims' problems, or a vehicle kept at the disposal of the villagers of Cortalim to transport them at any time to the hospital, despite such

requests being made by the victims. The maximum that was done was a superficial inquiry conducted by the medical officer in charge of the Primary Health Centre at Cansaulim, the report of which was submitted to the Deputy Collector, Margao.

About ten days after the accident, the Government announced that the Collector of South Goa would head a five member Committee to look into compensation claims and write a report in three days. The victims were asked to contact the Collector. Later, the Collector and the team visited the site of the accident and recorded claims. But rather than move towards taking action, these officials tried to suppress evidence and intimidate witnesses. Finally, the aggrieved people had to go to the High Court for relief. The case dragged on here for some years without the petitioners receiving any relief, as the medical reports submitted by the authorities were equivocal regarding the damages caused. Eventually, the High Court dismissed the petition, stating it could do nothing in the matter.

Another disaster — In an eerie replay of the above accident, on 6.7.91, another truck carrying chlorine between the same two companies met with an accident near Chinchinim in South Goa.

This time, fortunately, there were no deaths, but other adverse health effects were noted. Many victims had to take medical treatment. There was also damage to crops and fruit-bearing trees. Sufficient precaution was not taken to ensure that leakage was stopped immediately and nearly 1000 kgs escaped into the atmosphere. Some persons were forced to vacate their houses due to the unbearable stench and odour. Many people were unable to go to work with consequent loss of wages.

By this time, the Public Liability Insurance Act, 1991, had come into force and proceedings were initiated under this Act by the District Collector.

Rather than own up and pay for their sins of omission and commission, the companies as well as the transporter engaged in all kinds of specious reasoning to avoid being judged liable. They questioned the jurisdiction of the Collector, the applicability of the Act and the nature of injuries. Fortunately, the Collector dismissed all these contentions. Due to various difficulties, compensation of just Rs 39,927 was awarded, but the important principle of liability was upheld. This was the first case in India in which compensation under the new Act was awarded.

Since then, and despite the observations and recommendations of two Expert Committees on Hazardous Chemicals (see below), the hazards on Goa's roads have increased.

Expert Committee Reports on Hazardous Industries in Goa

Shortly after the Bhopal gas disaster of December 1984, the Government of India decided that all hazardous industries should be carefully investigated. In Goa, since there were only a limited number of industries dealing with hazardous substances, the Government requisitioned the services of the Task Force on Safety in Hazardous Industries in Karnataka to examine these plants. The Task Force visited Goa in April, 1987. It visited the Ciba-Geigy plant at Corlim, the LPG Bottling Plant of Hindustan Petroleum at Kundaim, the Zuari Industries fertiliser unit at Sancoale and the Salgaoncar Industrial Gases unit at Cortalim.

In all these cases the committee reviewed the existing safety set up, identified hazards, reviewed past safety performance and generally investigated safety procedure at the plants. It identified areas where likely major hazards could occur and then made necessary recommendations. Its observations regarding Ciba-Geigy:

'There are leakages of chlorine and other compounds and these are felt very strongly in the nearby village named Dhulapi which is at a distance of approximately one km from the factory. This was brought to the attention of the committee by one of the representatives who also happens to be the Sarpanch of that area.

'The workers were also concerned about the storage and filling of cylinders of methyl chloride, which is highly toxic. They brought to the attention of the committee that a cylinder, while filling, had bulged and it was a matter of good fortune that this cylinder did not crack, thereby releasing large amounts of methyl chloride into the atmosphere.

'The Task Force is seriously concerned about the release of methyl chloride, chlorine and other hazardous chemicals into the atmosphere. That such releases have taken place is evident from the vociferous complaints of the villagers nearby. It is extremely important that the villagers should be informed and mechanisms should be generated so that villagers should know that an emergency situation has arisen and should also know what action should be taken at their end if such emergency arises. The Company is considering the installation of emergency alarms for the villagers.

'Detailed emergency plans do not exist at present, though some attempt has been made. A formal plan should be made, giving the details of all who can declare the emergency and what procedures have to be followed for controlling hazards and for evacuating the people. As the factory is located relatively farther away from thickly populated areas the level of risk is somewhat lower. However, there are 8000 people living around this factory and it is necessary that emergency plans be made at the earliest.'

The Task Force also made observations and recommendations about Zuari Industries and other companies. Though the report was given to the Goa Government in 1987, few of its recommendations were implemented.

Almost 10 years after the first Task Force submitted its report, the Government of Goa ordered a review of the status of major accident hazard units by a second Task Force, this time headed by Dr. M.M. Mallikarjun of CLRI, Chennai, and three other members.

The second Task Force again visited the Ciba Geigy Plant at Corlim, Zuari Agro Chemicals, Hindustan Petroleum's LPG Bottling Plant and its Vasco terminal and the Vasco terminal of the Indian Oil Corporation as well.

It also went separately into the hazards of transporting large quantities of hazardous chemicals by road through the State—a point that had been highlighted by the earlier Task Force as well.

The second Task Force submitted its report in 1996 and made several recommendations including improvement of safety standards, preparation of disaster management plans and measures for reducing possibility of accidents on Goan roads. The report contains a detailed consequence analysis of accidents at the various sites and the impact of these accidents in terms of km range. Though the report was submitted in 1996 very few of the recommendations have been carried out.

As the Goa Government does not have the requisite technical expertise which would enable it to foresee the demand that new industries may have for import of hazardous materials, it is obvious that the citizens of Goa would have to keep facing the prospect of larger and larger quantities of such hazardous chemicals being moved into and across the state.

The HPCC itself is always comprised of officials and heads of Government departments, none of whom even looks at the setting up of industries from the point of view of the chemicals such units require and the fact that since such chemicals are not produced in Goa, they have to be imported from out of the State through Goan roads.

FOREST DEPARTMENT AFFORESTATION PROGRAMME: AN ALTERNATIVE

While the Department of Industries has been attempting to locate industrial estates on the plateaus, the Forest Department has been trying to take the plateaus over for afforestation.

This is a laudable effort as the midland plateaus would spring back to life if the earlier vegetation were restored. This would make the plateaus healthy, thriving areas once again, rather than converting them into barren moonscapes as the Department of Industries proposes to do. Unfortunately, though, the afforestation project suffers from the chronic monoculture mania which afflicts the Forest Department as a whole. It also seems to have been conceived without taking into account the needs of the locals.

In 1986, for example, the Department of Forests had planted over 700 hectares of the Comunidade lands of Pirna and Tivim in north Goa and 400 hectares of the Usgao Comunidade in South Goa. A notable feature of the afforestation at Usgao was the regeneration of indigenous species like *Kindal* and *Marat* from old root stock due to the intense protection afforded to the plots as a whole.

According to the then Forest Conservator, the afforestation was being done with the specific purpose of providing villagers in the surrounding areas with small timber, fodder and fruit, thereby reducing pressures on the natural and degraded areas of forest. However it was not clear where the fodder and fruit from the new plantations would come from since the only species being planted on a massive scale was the *Australian acacia*, which provides neither. The density of plantation also makes remote the likelihood of regeneration of indigenous species from root stock; it is difficult for indigenous trees to survive when choked by a profusion of fast-growing exotics.

Peacocks have adopted several reforested sites as their habitat



But the planting goes on. In 1987 the Nirancol Comunidade allowed the Forest Department to plant 700 hectares on lands owned by it and the Chandreshwar Devasthan in south Goa was intending to plant an area, additional to the 300 hectares it had already planted, with assistance from the Forest Department.

By 1991-92, 419 hectares went under afforestation at Keri, Dodamarg, Kakoda, Molcornem, Cotambi, Cuncolim, Curtorim, Saligao, Bambolim, Majorda, Arossim, Adnem and Mandrem.

The Saligao plantations were damaged in fires in 1991 and 1992. The department gives no explanation for the cause of the fire, but says that most of the plants have survived the fires. Since the afforestation projects are also being carried out in areas that were part of the village grazing lands, it appears that there is some resentment among villagers that they are no longer able to enter such areas freely.

The above instances of suspected arson highlight some of the weaknesses of the approach of the Forest Department. Despite Joint Forest Planning and Management (JFPM) schemes having been initiated in most parts of the country, the Forest Department in Goa does not appear to have woken up to the need to involve local villagers and forest-dwelling communities in the planning and management of forests.

Land which is without trees is not necessarily useless; it may provide important pasture grounds for local people. Afforestation with exotic fast growing softwood species in such areas or areas where natural forest has been cleared is worse than useless—it deprives the local people of an important natural resource. What is needed is a process of detailed consultation with local communities in which indigenous species that can meet their fuel wood, timber, and manure needs are identified. The species mix in areas to be planted carefully identified in order that the important additional income derived by local people from these is not lost.

On the conservation side, every effort must be made for regeneration from root stock. Experience in many parts of

the country has shown that merely providing adequate protection to an area from human and animal interference is sufficient to achieve this goal. These lessons are well-known; the need is for Forest Department to put them into practice.

Forest Department Afforestation Work

(Period: 1981-2000)

North Goa

Total Area - 814.5 Ha

Roadside Area - 364.6 R.km

South Goa

Total Area - 2177.5 Ha

Roadside Area - 257.5 R.km

Not By Fish Alone

There is a small Goan community of pure vegetarian non-Saraswat Brahmins who do not eat fish and have evolved their own eco-based life-style.

They are responsible for the beautiful arecanut orchards of the Ponda region, which are one of the most astonishing ecosystems made by human beings this side of the Western Ghats. Developed mostly by Dravid Brahmins, the areca garden is a centuries old system, dynamic enough to respond to changes of time.

Areca farms, for instance, were the first to use pesticides half a century back; they also rapidly took to sprinkler and drip irrigation systems. Now, some have begun experimenting with vermiculture and natural farming practices. This is also the community in which bio-gas has been put to maximum use.

Chandranath Temple (1871)

Hill slopes steeper than 45 degrees are elaborately exploited relying on the ecological norms of soil conservation including terracing and bunding.

Water management and conservation practices exhibit a great degree of foresight and practical wisdom. Water sheds have been utilized at micro-catchment level.

The multitiered, plural-crop pattern of intensive farming closely imitates the rich biodiversity of the Western Ghats ecosystem. The highest vegetation tier is composed of areca, coconut, mango, jackfruit, *ont* (a tamarind type fruit), and a few other tall tree types. Flowering trees like *bakul*, *champak*, *surangui*, *nagchampak* and *ashoka* are also part of the family. The lower tier vegetation is composed of kokum, bread fruit, nutmeg, cinnamon, star apple and banana along with climbers like betel leaves and pepper.

The lowest tier is devoted to pineapple, *suran* and sometimes even *elaichi* (cardamom). This crop mosaic is a well designed system largely free of the pathogens and illnesses brought on by the monocultures in other farms elsewhere in Goa.

The farmer's life-style is carefully integrated with farming processes. The farmer lives on the farm throughout. The cool, thickly shaded farm provides an excellent living and working environment within a hot tropical climate. Water for drinking and household purposes is reused for the farm almost 100 per cent: the farmer lives close to a waterbody but does not spoil it.

Houses in the past were built of mud taken from the same place with a roof of wood and thatch, by-products of the farm.

Even today, except for rice and cereals, most of the necessities of food and living are met from the farm. This is reflected in the wide diversity and nutritive wholesomeness of the foodstuffs.

Activities are designed to follow the multiple use channel. Cattle are the consumers of agricultural waste and by-products. Dairy products and by-products are put to a variety of uses. Milk is one of the main food ingredients used by this vegetarian community. Cowdung is used as fuel and fertiliser, earlier as dung cakes, now through gobar gas. Farm activities and the traditional processing of the farm produce keep the farmer's family busy throughout the year. Only in the period of heavy monsoon, *Ashadh* and *Shravan*, is there a slack period which is used for Vedic learning, performances of various religious rites, reading of the Puranas and so on.

The areca garden closely follows the land forms of the area. Hill tops are mostly barren and are used by Dhangars as grasslands for their goats and monsoon crops. Hill slopes in the higher ranges where there is no perennial water source are maintained as jungle for mulching, fuel and timber needs and jungle crops such as cashew and bamboo. This part is perhaps an area where the natural forest species are conserved.

Somewhere in the middle of the slope where there are springs, the areca cultivation starts. It continues upto the down-stretch till the available water source can be managed perennially. After that, in the relatively flat portion, is the coconut grove. At the lowest level, which can be flooded by bunding the *nallahs*, are the paddy fields.

The traditional water harvesting system is very scientific. The catchment is bunded and a series of check dams at different heights gives maximum conservation results. The bunding is a community activity and sharing the water harvest is done following a tightly scheduled programme. This means that some have to irrigate at midnight so that the water does not spill over the tank bund and go waste.

K.D. Sadhale



TEMPLE ZONE

The taluka of Ponda is situated in the heart of Gomantak, that is, Goa. Appropriately, it is also the abode of temples.

At the height of the religious terrorism of the Portuguese some 400 years ago, a large number of temples, mostly from Salcete, were shifted to Ponda taluka which was then known as Antruz Mahal and was under the reign of the Raja Saundhekar.

The shifted temples, added to the existing ones, created a rich profusion of temples in the area. Today we still see them concentrated in three areas: Kavalem-Bandivade, Mardol-Velling and Marcela. The richest concentration is of course in the Kavalem-Bandivade belt, which environmental groups like *Nirmal Vishwa* have been demanding should be declared a conservation zone.

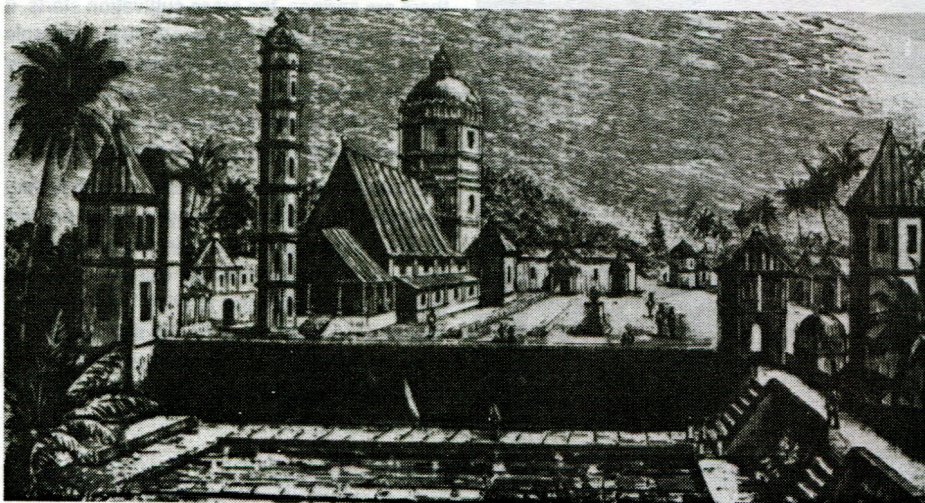
The style of temple architecture in the central west coast of India has distinctive traits. The temple form has evolved fully from the Indian temple style but climatic factors, local building materials, etc, have also influenced the process of evolution of the present temple form. Historical events such as Mohammedan and Portuguese rule also introduced alien building techniques, forms and features, generating their own peripheral influences on this style.

Thus, though the temple is built on the traditional Indian plan, its superstructure presents a distinct variation from other Indian temple forms. Here the Garbhagriha assumes the shape of an octagonal tower culminating in a masonry or copper dome. The rest of the temple sections bear impressive roof forms of a variety of heights presenting an enchanting profile against the live backdrop of evergreen hills.

Though there has been a transition in building techniques and material, from wood to stone, over a period of a couple of centuries, the overall character of the temple and its surroundings have remained unchanged till the middle of this century.

The temple is encircled by a well-defined courtyard or *prakara* bounded by structures directly connected with the temple activity, such as the *pariwar devta* (associated deity), houses of temple employees, *agrashalas*, entrance arch, deep *stambha* and in most cases a well built water tank.

The Shantadurga temple a hundred years ago.



A perennial water source formed an integral part of the temple, water having multiple roles: aesthetic, spiritual and utilitarian. *Poornakalash*, a pot full of water, is worshipped in most religious rites and the most precious offering to the sun since Vedic times is *Arghya*—water. Water has been valued to such an extent it has been ceremoniously installed at the highest point of the temple, at the top of the *Shikhara*, symbolising it in the form of the *Kalash*. Trees such as Pipal, Banyan, Pagoda, Parijat, etc, with a well-built pedestal around, also formed part of the temple complex.

The grouping of houses peripherally around a centrally located temple, completed the small temple village called a '*Sthal*'.

These structures integrated well with the temple and with each other. The closely packed houses were prudently provided with scaled paths, courts, open spaces and the whole setup blended admirably with the conserved vegetation and landforms. The entire village housing profile and other built forms echoed the dominant tone set by the temple. The roof forms, the skyline, the vertical faces and details forming the built forms and the trees, the paths, the spaces, and the terraced and vegetated topography all formed part of a well balanced environment.

The setting of the temples clearly indicates that our ancestors greatly valued the aesthetic quality of landscapes. Most of the temples had verdant backdrops of hills and a lush green foreground of paddy fields laced with art work of winding water courses and vegetation.

The physical environment which represented a harmonious interaction between people and nature was conducive to social and cultural growth. It is not surprising that it is in this very area that we have witnessed a high concentration of social and cultural activities. The resulting environment helped build up idealistic men and women: not for nothing have some of the country's principal singers and writers emerged from the temple zone of Ponda.

Today's threat to the temples comes from Ponda town and from development around the temple complexes.

Ponda's development is touching the villages of Kavalem and Bandora and exerting undesirable development pressures on these villages. This has severely threatened the beautiful environment built up over a period of centuries.

The trend of ill-conceived modernism has eroded most of the tidier aspects of the natural and human heritage. Even the temple, the most sacred of the edifices, is sometimes thoughtlessly meddled with. Due to the growing craze for using modern building materials and techniques, the original building form is being subjected to unpalatable changes which only succeed in creating scars on the softly balanced landscape.

Borrowed and rootless built forms are replacing the logical forms and features evolved over the centuries. Sometimes the new structures are so outlandish in character and so

monstrous in form that they tend to humiliate the other important heritage structures of the place. The earlier buildings, for instance, had soft line details of simple mouldings, plasters, roof overhangs, etc., creating overall a soft cool-light-and-shade effect. This is being harshly contrasted by a new breed of modern appendages with large blank surfaces and rigid lines and outrageous forms.

Despite our tradition having assigned an exalted place to water and to its purity, we have dirtied it in the name of development.

Most of the wells around the temples have been polluted by the sewage of recently constructed *agrashalas*, too big for the carrying capacity of the place. Several wells have had to be closed down due to pollution. Trees are cut but not replaced. Even the land forms are not spared. Hills are shaved, cut and bulldozed, leaving a depressing scenario of open scars.

Concentration of buildings and commercial activities attract crows, dirt and litter, disturbing the clean and serene environment.

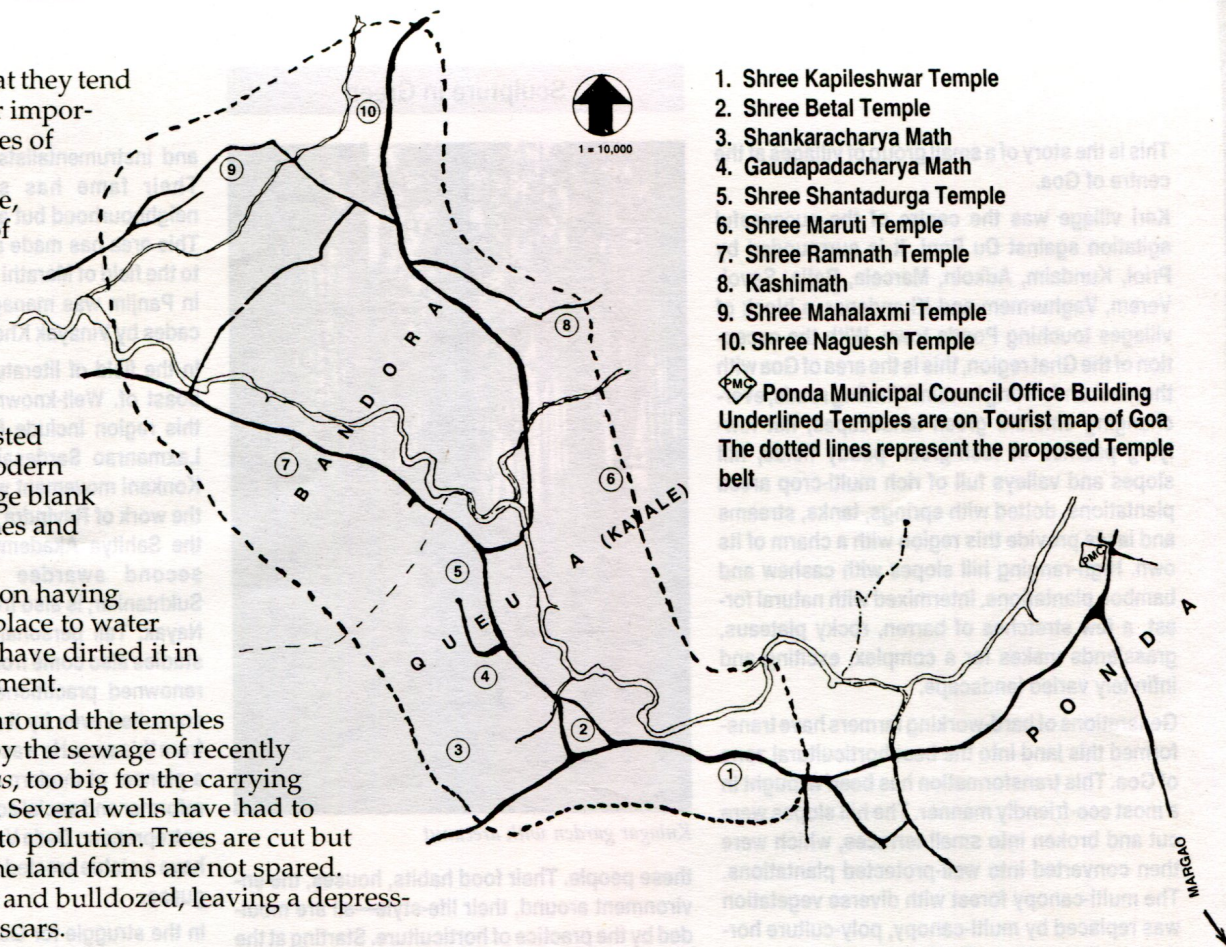
If all this is to be checked efficiently, a multilevel integrated approach is necessary to work out an effective conservation strategy in which the government, the temple authorities and public in general play a vital role.

The entire temple belt of Kavalem-Bandivade temples must therefore be declared a conservation area. A proper pattern for its development should be worked out. The exercise should be backed with proper legal and administrative tools and an efficient monitoring agency. It is imperative that the type and intensity of land use is strictly controlled. Hill slopes, water bodies and paddy fields should not be touched for any reason and no structures should be allowed to come too close to the water bodies and paddy fields.

In the case of major development activities, a proper sewage treatment plant should be installed to avoid pollution of water bodies and groundwater.

External forms and features of buildings should conform to the heritage of the place. Suitable models, prototypes, features, colours and textures can be suggested. No building other than the temple structures should be over conspicuous by size, design, colour or location. Even temporary structures and other built forms should be made to follow a design discipline. Except for cottage industries, no other industries should be allowed. Uses of buildings in the area must be controlled. Hoardings should not be allowed. Neither should the trade in liquor be permitted. Quarrying of hills should be strictly prohibited.

The most sensitive areas should be studied in detail and a comprehensive development plan should be



1. Shree Kapileshwar Temple
2. Shree Betal Temple
3. Shankaracharya Math
4. Gaudapadacharya Math
5. Shree Shantadurga Temple
6. Shree Maruti Temple
7. Shree Ramnath Temple
8. Kashimath
9. Shree Mahalaxmi Temple
10. Shree Naguesh Temple

PMO Ponda Municipal Council Office Building
Underlined Temples are on Tourist map of Goa
The dotted lines represent the proposed Temple belt

The Shantadurga temple today



prepared to improve infrastructure facilities, to enhance the existing assets of the temple heritage and to correct the wrongs done so far.

Besides the Kavalem-Bandivade belt, certain other spots in Ponda taluka such as Mangueshi and Mahalsa temple at Mardol, Kamakshi temple at Shiroda, Vijaydurga temple at Keri and Safa Masjid at Ponda need to be conserved on account of the significant character of the structures and of the landscape around.

There are some welcome signs that environmental damage is no longer going to be accepted. The Shri Naguesh temple authorities have decided to take the drainage a good distance away from the temple complex. Another bold decision by the same authorities is to

Sculpture in Green

This is the story of a small group of villages at the centre of Goa.

Keri village was the centre of the successful agitation against Du Pont. It is surrounded by Priol, Kundaim, Adkoln, Marcela, Betla, Savoi-Verem, Vaghurmem and Khandepar, a block of villages touching Ponda town. With the exception of the Ghat region, this is the area of Goa with the most undulating terrain. Winding roads, ever-changing emerald green landscapes, flat low-lying patches of lush-green paddy fields, hill slopes and valleys full of rich multi-crop areca plantations, dotted with springs, tanks, streams and lakes provide this region with a charm of its own. High-ranging hill slopes with cashew and bamboo plantations, intermixed with natural forest, a few stretches of barren, rocky plateaus, grasslands makes for a complex, exciting and infinitely varied landscape.

Generations of hard-working farmers have transformed this land into the best horticultural zone of Goa. This transformation has been wrought in a most eco-friendly manner. The hill slopes were cut and broken into small terraces, which were then converted into well-protected plantations. The multi-canopy forest with diverse vegetation was replaced by multi-canopy, poly-culture horticultural plantations. Tall fruit trees like coconut, areca, mango, jackfruit, kokum etc. constitute the highest tier of the canopy; the lower canopy has spices like nutmeg, cinnamon, pepper and fruits like bananas, citric fruits of *toring*, *bimbal*, *karmal* etc. and the lowest tier with pineapples and vegetables. Excellent water management systems and eco-friendly farming practices combined with love and devotion towards the plantation. The people here are proud of their farming heritage. Each one has a story to tell how he and his ancestors have developed and maintained the land through a variety of difficult situations. The trees in their orchards have a distinct history and identity of their own. Horticulture is not merely a vocation; it is part of the very culture of



Kulagar garden with arecanut

these people. Their food habits, houses, the environment around, their life-style—all are moulded by the practice of horticulture. Starting at the crack of dawn and ending at dusk (and sometimes even beyond that), the whole day is devoted to work. There are different kinds of work in different seasons. Tilling, weeding, irrigation, manuring, climbing the trees, collecting fruits, drying, processing, marketing, climbing up and down the high contours with heavy baskets.

The hands which worked with brain and heart to carve out this green sculpture of unique character have skills of diverse nature—as diverse as the landscape. Some of the best artistes in India hail from this place. Lata Mangeshkar, the most famous singer of this century, Kesarbai Kerkar, who was honoured with the title 'Surashree' by Rabindranath Tagore, and a galaxy of vocalists

and instrumentalists all hail from this region. Their fame has spread not only in the neighbourhood but all over India and the world. This area has made a phenomenal contribution to the field of Marathi theatre. The Kala Academy in Panjim was managed for more than two decades by Vinayak Khedkar from this very region.

In the field of literature, this area has much to boast of. Well-known Marathi literateurs from this region include B.B. Borkar, A.K. Priolkar, Laxmanrao Sardesai and B.D. Satoskar. The Konkani movement was given a strong base by the work of Ravindra Kelekar, the first winner of the Sahitya Akademy Award in Konkani. The second awardee in Konkani, Dattaram Sukhtankar, is also from this area as is Pundalik Nayak. Tall personalities in the field of Vedic studies also come from this area. Dada Vaidya, a renowned practitioner of Ayurveda, who was consulted even by the Portuguese Governor, is from this area. He was a multifaceted personality, a pioneer of modern education in Goa, a social reformer and social activist, a writer as well as an entrepreneur. Dada Vaidya was the only Hindu to have a statue erected in his honour by the Portuguese.

In the struggle for Goa's Liberation, this region provided a bumper crop of freedom fighters, with Mohan Ranade probably the best-known.

Half a millennium ago, the Portuguese destroyed the Golden Age of Goa developed since Kadamba rule with all its physical and cultural riches in the talukas of Tiswadi, Salcete, Mormugao and Bardez. Conservation of this heritage of Golden Goa was taken up by this region for half a millennium. Although the physical wealth could not be preserved, the cultural one was well nursed. Even the deities from the magnificent temples destroyed by the Portuguese were brought here, converting this region into a temple zone.

K.D. Sadhale

demolish a quarter-century old *agrashala* which blocked the view of the beautiful perennial water tank considered the pride of the temple. *Nirmal Vishwa* has also been involved in the plans to landscape the campus of the temple.

Other conscious efforts to conserve the character of the temple environment can be seen with the recent developments at Keri, Veling and Partagal where an attempt has been made to link new development with the architectural tradition of the temple. The Partagal math complex sets an example of how substantial new development can be carried out while maintaining the proper scale between built and open spaces. Some temple authorities have also banned gambling and the use of loudspeakers in the *prakara* area.

If these positive developments can be intensified and extended through proper measures throughout the temple belt, we may just about succeed in conserving this amazing cultural heritage for future generations as well.



Tailpiece: The Ecology of Goan Food

Eating in traditional ways, patronizing and consuming local produce, is to contribute towards protecting and keeping alive the ecology of a place. Eating and drinking are vitally related to local ecological systems and primary to all of us.

Goan cuisine is a triple-decker affair with an interplay between what the tribal Gavdas, Velips, Kunbis and Dhangars cultivate to drink and eat, the contribution of the Hindu Saraswat Brahmins whose cuisine evolved into a fine art *vis-à-vis* vegetarian and non-vegetarian cuisine, and finally, Portuguese Christian cuisine which is a true hybrid child born in the wake of large numbers of people converting to the Catholic faith to get on with their lives.

As with most primary agrarian societies the original settlers of Goa, i.e. the tribal communities, have always lived close to the bosom of Mother Earth and to this day—give or take a little—they still try to stay as close. Basically farming communities, they live an environment-friendly lifestyle in the best sense of the word, i.e. taking from and returning more or less equally to the good earth. They grow red millet (i.e. *nachne*) and rice, country or native vegetables like pumpkins, gourds, tubers and greens like *tambdi bhaji* and complement a naturally wholesome diet with fish from the rivers and seas. Their needs have remained basic because they have remained largely illiterate in the sense that we understand illiteracy today—unable to read and write—but seasoned with experience in skillfully studying the seasons, the soil, the monsoon, and cultivating their crops in their plots of land accordingly to the hospitality of the seasons.

It is in these tribal *vaddos* that we can still see how native Goa eats: it is a fascinating world subsisting on nutritious millet or rice porridge or millet or rice bread or *bhakri*.

The Hindu Saraswat Brahmins who have settled in pockets along the Konkani coast make up no more than three percent of the population in Goa, but it's a community with a wonderful roll call of vegetarian and non-vegetarian recipes in their cuisine.

The Hindu Saraswat Brahmins have a long and fascinating migratory history, one to which they cling to with devotion. Tracing their roots to early Aryan settlers by the banks of the river Saraswati in Kashmir, the story goes that during a period of natural upheaval and famine, not only were they forced to migrate further down into the subcontinent, but also turn non-vegetarian to survive! The Saraswat Brahmins of the Konkani are said to be the non-vegetarian Brahmin community of the subcontinent because they relish fish with passion ... members of the community recount a legend about how the river Saraswati herself (the majority of rivers in India enjoy divine female personae) at its *sangam* (union) with the Ganga and Yamuna rivers in Allahabad urged the Saraswat Brahmin community to eat fish from its

waters. The river may have gone underground or vanished from the subcontinent but the community remains devoted to the river in its personification, namely the goddess Saraswati, the goddess of learning, music and the fine arts.

Their vegetarian tradition invited and built on such local produce as coconuts, *kokum*, tamarind, the sour fruit of the hogplum or wild mango called *ambade*, and a wide variety of native vegetables which include several varieties of gourds (e.g. ash gourd, bitter gourd, bottle gourd, ribbed gourd, snake gourd, wax gourd), tubers and root vegetables (e.g. colocasia, yam, purple yam, tapioca, potatoes), vegetables like green papaya, green banana, banana stem, unripe jackfruit, white radish and radish greens, drumstick flowers, greens and sticks, cluster beans, field beans, brinjals.

It is the Hindu Saraswat Brahmin families which have remained faithful to native produce with housewives taking pride in honing their culinary skills *vis-à-vis* both vegetarian and non-vegetarian fare. Cooking is a fine art, no less. In my opinion it is the Hindu Saraswat Brahmin cuisine which is the *pièce de résistance* cuisine of Goa! Since the community goes totally *shivrak* or vegetarian on religious occasions, vegetables are not just token additions to a fish or meat dish (as they so often are in Goan Christian cooking), but recipes to be savoured in their own right with *chappaties* or rice. There's a liberal use of freshly grated coconut and this is mixed in as a final garnishing touch to many a vegetarian dish, e.g. the popular *tambdi bhaji* or red amaranth greens are quickly cooked, seasoned lightly with spices and finally laced with freshly grated coconut. It is one of Goa's favourite mouthwatering flavours. String beans, French beans, cluster beans, cabbage, sprouted *mung* beans—they're all cooked similarly i.e. with a final touch of freshly grated coconut.

That is why tribal and Hindu Saraswat Brahmin cuisines are remarkably light on the stomach; in fact, tribal cuisine doesn't feature any oil, refined or unrefined.

This brings me to the third and more commonly recognized cuisine of Goa, fairly or unfairly. This is the Portuguese influenced cuisine which the majority of Goan Christians are familiar with.

A predominantly seafood and meat eating people, the Portuguese ships carried salted pork and fish for the crew and there was a regular supply of these for Portuguese settlers in Goa. Fish and other seafood were abundantly available in Goa but the constant need for fresh meat soon saw the domestication of pigs and a ready supply of pork for the Portuguese and Europeans in general.

In medieval Portugal and Europe villages were known to have subscribed to the twofold utility value of setting up piggeries, i.e. both for culinary and sanitation purposes. Incidentally, it is a

system which is hailed by today's ecologists as both hygienically sound and extremely environment-friendly. In Goa, the Portuguese left in 1961 but the sprawling old Portuguese-styled mansions in rural Goa still sport pig latrines in their backyards and Goa is famous for its pork sausages—especially the small red sausages inspired by the Portuguese garlic sausage called *chourico*. Goan *chourico*, however, was cured with the use of chillies, *feni* (cashew liquor), toddy (the fermented juice of the toddy palm's sap), vinegar and chillies.

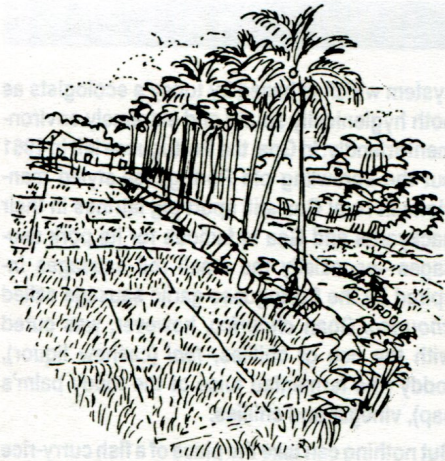
But nothing can take the place of a fish curry-rice meal in the Goan's heart, Be they Christian or Hindu! Fish curry-rice (*xit-koddi* in local Konkani parlance) is common to Goans of all traditions and influence and both communities share a passion for it even if they cook their *xit-koddi* in different ways. Goa is blessed with a 105 km long coastline and ten major rivers, so there is an abundant supply of fish all the year round, except during the monsoon. Even then meals revolve around fish, i.e. dry fish, salted fish, pickled fish. Most Goans recognize fish which comes from the sea, from the brackish inland waters, rivers, lakes, ponds and the roll call of Goan fish is impressive beginning with the much-loved mackerel (*bangde*), kingfish (*surmai*), sardines (*pedve*), followed by perch (*bhekti*), salmon (*ranwas*), silver bream (*khadak palu*), pearl spot (*kalundar*), black shark (*mori*), catfish (*sangat*), *thigur*, *dhadyo*, *pittol* (fresh water fish all), grey mullets (*shevte*), silver whitting or ladyfish (*muddoshi*), pomfret (*pamplet*); and after the roll call of fish there is other marine life food like prawns, shrimp, squid, crabs, shellfish and mussels.

If fish curry has its connoisseurs, the rice which is served with it also has connoisseurs. Many Goans insist that fish curry tastes best with Goa's native aromatic fat grains of boiled rice. This rice enjoys a Goan identity all on its own.

Most of us take the act of drinking and eating for granted, paying scant attention to it. What we drink and eat and how we do it determines the status of the health of our land and hence our own health. By increasingly patronizing the processed, branded, promoted and now bio-engineered food industry, we are helping to kill our own natural, fresh and life-giving markets.

Thankfully a majority of people in Goa still believe in the intrinsic goodness of patronizing the fresh local produce of our traditional markets. We believe in cooking our meals or putting them together afresh on a daily basis—as opposed to meals based on nutritionally dead and environment unfriendly convenience foods in cans, packets, bottles. *Viva* to that!

Tara Narayan



The third distinct ecological component of the Goa bioregion—after the Western Ghat area and the lateritic plateaus—is the alluvial lowlands. These comprise the stretches of rivers which have over the centuries received the eroded material from the higher levels of the Sahyadris. The two major riverine plains are those of the Mandovi and the Zuari rivers which between themselves comprise the major alluvial deposits. The Chapora in the North and the Kushavati and Sal rivers basins are the locations of the other major riverine plains in Goa.

From the coastline, if you leave aside a narrow 80 m stretch from the sea, the entire lowlands strip, varying in



The transplanting of paddy in the khazans

The Alluvial and Coastal Plains

width from 12 to 15 km is the most developed part of the State, containing about 80% of the population.

Besides these rivers, there are numerous wetlands, a few of them man-made, but the rest largely natural. Many of these wetlands are the habitats of a large variety of birds. Some of them are used for purposes of irrigation. The most important of these are the wetlands of Carambolim, Chimbél, Mayem, Cacora and Calafur.

On the coastal side, beyond the beaches, one finds the alluvial valleys of the major rivers like the Chapora, the Mapusa, the Mandovi and the Zuari. However, such alluvial plains and valleys can be found in between the plateau regions as well. All these alluvial valleys are areas of rich cultivation with settlements of agricultural populations.

The entire area comprises a distinct ecological zone of the State. It comprises the main paddy-growing areas including the *khazans*, but excludes the cashew growing areas which are generally found in the higher tracts. Besides paddy, the other principal crop is coconut. Both rice and coconut, together with the fish harvested from the seas and rivers, are essential to the idea of Goa as it has evolved over the centuries. Only the proper and adequate availability of all three elements can continue to bring mental and spiritual peace to the local population.

Tourism promoters and the Goa government have attempted in recent years to advertise Goa as one of the greenest regions on the planet.

Much of this greenery is man-made, created through hard work by ordinary villagers, in their fields and their fruit gardens.

Every year, during the monsoon, thousands of farmers transform Goa's fields into a carpet of green. What was brown in the months of April and May is now green with paddy, in every nook and corner of every village.

Every June and July, Goans go crazy over plants, sticking all kinds of them into the ground. From bamboo to jackfruit, coconut to cashew.

It is this almost magical enterprise that is now belittled by a ruling political elite, obsessed as it is with converting agricultural lands, in collusion with land developers, to high-priced, high rise buildings and shops. Altering the outward character of Goa now and for the future. As everyone acknowledges, for the worse.

WETLANDS AND BIRD-FRIENDLY LAKES

Freshwater lakes adorn the picturesque landscape of the tiny state of Goa, as diamonds in a crown. These lakes are age-old, rain-fed, reservoirs of water, dating back to the pre Portuguese period. Most of the lakes in the state are semipermanent water bodies. Hence, they qualify as wetlands, according to the definition proposed by Cowardin in 1979: 'Lands of transition between terrestrial and aquatic system wherein the water table is usually at or near the surface or the land is covered by shallow water.' From time immemorial, water from the lakes has been used to irrigate the *rabi* crop of paddy cultivated in the low-lying areas surrounding the lakes. Except for the



A small flock of Coots, the third dominant winter visitor at Carambolim

central deepest part of the watercourse within the lake, which remains water laden throughout the year, the rest of the lake area is used for the cultivation of the *kharif* crop of paddy. Mid-September sees the harvesting of the paddy crop and flooding of the lakes. The lakes are then used as traditional aquaculture tanks. The fish thus naturally grown in the lakes are harvested in phases, by bidding during the annual drawdown in mid-April.

These freshwater lakes with their diverse floral and faunal forms are rich repositories of biodiversity. After flooding, the residual stumps of paddy remaining in the lake or post-grazing remnants of grass serve as ideal habitat for the growing fish fry. On decomposition they also enrich the organic nutrient content of the lake, facilitating the luxuriant growth of submergent and rooted macrophytes. The vegetation of most of these water bodies comprises a luxuriant green carpet of *Hydrilla verticellata* and *Utricularia aurea*, complete with the white lilies of *Nymphoides* species dancing to the rhythm of the whispering breeze. The varied and abundant vegetation in the lakes in turn sustains a diverse population of planktonic and benthic forms.

The balanced hydrophytic vegetation, rich planktonic diversity, sufficient benthic macro-invertebrate population and adequate fish make the lakes a favourite haunt of a variety of waterfowl which include herbivorous ducks, insectivorous rails, benthivorous waders and piscivorous divers. Thousands of resident as well as migrant waterfowl throng the lakes every year from as far north as Siberia. While the lakes provide the requisite habitat for the waterfowl, their surroundings cater to the needs of the terrestrial birds. A total of 163 species of birds, of which the migrants alone contribute 55 species, have been observed in and around these water bodies.

Surprisingly, during the course of our prolonged studies of the below mentioned water bodies in the state, we did not encounter the presence of mosquito larvae in any of the lakes. Sardesai and coworkers had attributed this to the presence of an alga—*Chara* sp. However, we did not encounter this alga in any of the lakes we studied. Based on a detailed long-term study, we attribute, the absence of the mosquito larvae in the lakes to the presence of waterfowl, especially Anatids who continuously

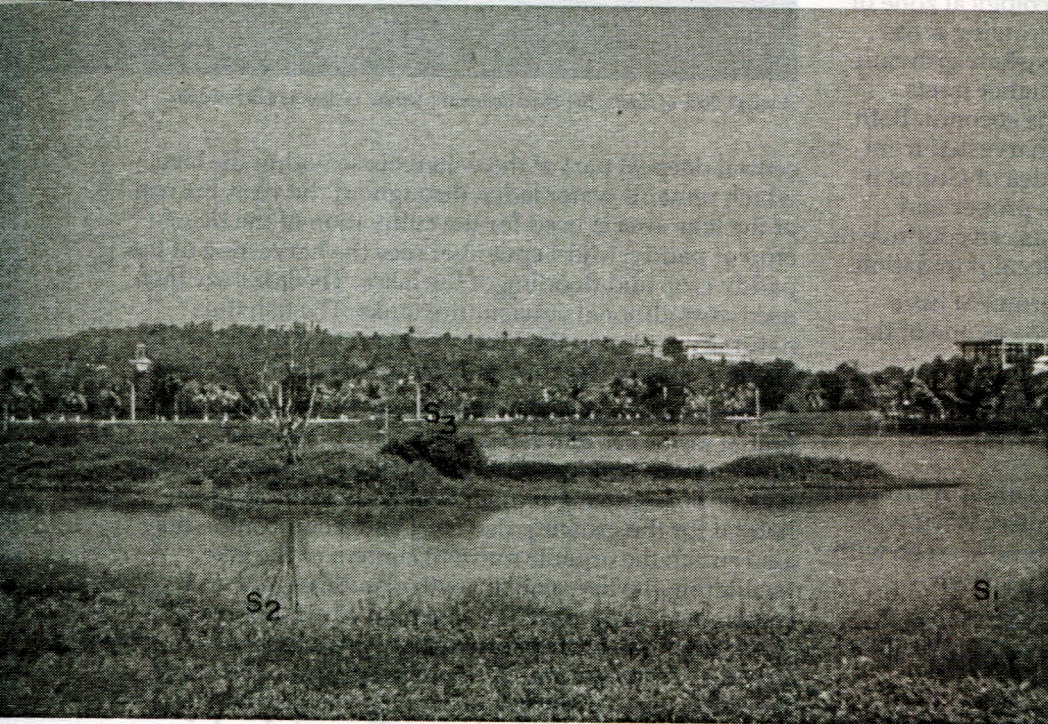
disturb the water by their dabbling and diving action, thereby preventing the water from the deleterious effects of continuous stagnation. Hence it is essential that the water bodies in the state are made bird-friendly so that the state may benefit not only from an aesthetic point of view but also from a socioeconomic and financial point of view, as there will then be less instances of diseases spread by mosquito as a vector. Carambolim, Pilar and Santa Monica lakes from Tiswadi deserve special consideration from these angles.

Carambolim Lake — Carambolim Lake (73° 55'N & 15° 30'E) is a pristine, man-made freshwater body. History has it that the lake was built primarily as an irrigation tank. This enchanting marvel lies nestled in the Tiswadi taluka of North Goa, with the 'Karmali Station' of the

The vegetation of the Carambolim Lake consists of a delicately woven, colourful carpet comprising a total of 13 species of macrophytes. Nearly 70% of the water surface of the lake is covered by a luxuriant growth of these macrophytes, the most dominant being the rooted floating water lilies, *Nymphae stellata*, with the emergent wild paddy, *Oryza rufipogon*, and the submergent, *Hydrilla verticellata*, coming a close second and third. The seasonal die-out of macrophytes owing to the management practice of annually drawing down the water further balances the organic nutrient content of the lake. This facilitates the growth and development of a large number of benthic macro-invertebrates, which include bristle worms, nematodes and insects such as *Dystiscus* sp., in the order of dominance.

The luxuriant growth of both rooted and submergent hydrophytes, coupled with the availability of open waters in the lake encourages the growth of diverse planktonic species. Of the total 26 phytoplanktonic species inhabiting the lake waters, the Cyanophyceae, *Oscillatoria formosa* is the most dominant. Among the zooplankton, naupliar larva is the most dominant of the 20 species found in the lake waters followed by the cladocere, *Lydia ciliata*. The dense macrophytic vegetation in unison with an immense population of benthic macro-invertebrates help sustain an equally varied population of fish species, which includes *Heteropneustis fossilis*, *Barbus amphibius*, *Rasbora daniconius* and *Aorichthys seenghala*.

A wide variety of waterfowl throng the Carambolim Lake year after year. A total of 117 species of birds, comprising both residents as well as migrants, patronize the lake environs throughout the year. The residents include the brilliantly coloured jacanas, moorhens, herons and egrets. Noteworthy among the migrants are the pintails, a single flock of which may consist of as many as 7200 birds. However, large numbers of lesser whistling teals and shovellers,



A view of the larger eastern sector of Santa Monica Lake. In the foreground, a rich stand of *Polygonum glabrum* can be seen.

Konkan Railway along its immediate western edge. The lake is a grazing marshland with a total area of 70 ha, of which only the central 40 ha remains water laden throughout the year.

Nesting Intensity in the Heronry during 1996 and 1997 at Santa Monica Lake

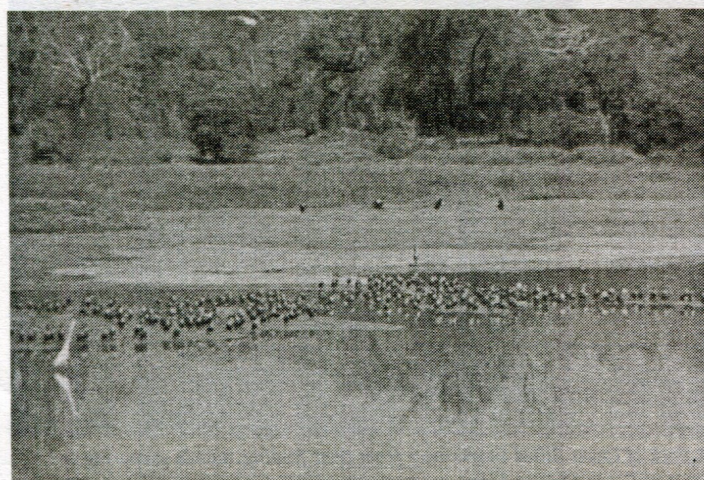
Nesting Birds Species	Number of Nests		%Change
	1996	1997	
Darter	5.00	13.00	+160.00
Little Cormorant	85.00	105.00	+23.50
Little Egret	80.00	60.00	+25.00
Purple Heron	18.00	24.00	+33.33
Cattle Egret	35.00	10.00	-71.42

Wetlands

Wetlands produce eight times as much as cultivable land, and are breeding grounds for birds. They are a source of drinking water for humans and any excess water that flows off the pavements is stored at these locations. In the monsoons, when the runoff from the land is excessive and the levels of the rivers rise, it is these wetlands that come to our rescue, acting as water storage and allaying the threat of inundation of low lying areas. They can then be used to gradually release the water, and provide valuable fishing grounds in times of need. Along with the mangroves, the wetlands constitute a very valuable renewable resource.



A Trio of Lesser Adjutant Storks at Santa Monica Lake. A good number of them utilise the lake site as the resting and the roosting ground.



A large flock of Lesser Whistling Teals resting at SML, during early summer.



A lone White Ibis, a rare winter visitor at SML, amidst a flock of White Necked Storks engaged in leisure activities of basking and preening.



Little Cormorants and the Purple Herons nesting on the *Peltophorum ferrugineum* at Santa Monica Lake

numbering up to 2000 individuals each, are not uncommon. Garganeys and Coots also visit the lake in large numbers. The other birds using the lake as a wintering ground include comb ducks, spotbill ducks, storks, ibises, spoonbills, dusky redshanks, etc.

The Carambolim Lake, too has not been spared the ravages of man's greed. Until the advent of the Konkan Railway, excessive siltation, human interference and increased nutrient input were some of the prime problems plaguing the lake. However, the original architectural design of the Konkan Railway route, if implemented, threatened to wipe the lake from the face of the earth. According to this plan, the railway tracks were to bisect the lake, thereby further depleting the already minuscule 40 ha of water laden area. Stiff and timely resistance by the alert environmentalist groups of the state provided the lake with a new lease of life. Thanks to their resolve and perseverance, the tracks were realigned to the western edge of the lake, occupying only 1 ha of its area. Although there was a substantial decline in the bird population visiting the lake during the actual construction and the implementation phases, their numbers have increased steadily since then.

Pilar Lake — The Pilar Lake ($73^{\circ}54'N$ & $15^{\circ}27'E$) is located in the scenic village of Pilar at a distance of 16 kms from Panjim, the capital city of the state. The lake with a surface area of 3.34 ha is a natural water body which is used as a multipurpose village tank.

The vegetation of Pilar Lake consists of a luxuriant spread of 10 species of macrophytes dominated by the emergent *Portulaca oleraceae* and submergents *Hydrilla verticellata* and *Utricularia aurea*. The increased levels of phosphates in the lake, owing to the surface runoff containing the residual material from the crematorium situated by the edge of the lake, further enhance the growth of macrophytes and plankton in the lake. Amongst the 3 lakes Pilar Lake has the maximum planktonic diversity comprising of 26 species of phytoplankton and 35 species of zooplankton. Among the phytoplankton, the Cyanophycean *Oscillatoria formosa* and Chlorophycean *Spirogyra lineata* are the most dominant, while among the zooplankton, the copepods, naupliar larva and *Cyclops bicuspidatus thomsi* dominate. The dense vegetation, varied planktonic population, together with a predominantly silty substratum supports a diverse population of benthic macro-invertebrates. Of the 10 species of benthic macro-invertebrates inhabiting the lake substratum, the insect, *Dytiscus* is the most dominant. The lake is also home to four species of fish. These include *Rasbora rasbora* which is the most dominant, followed by *Barbus amphibius*, *Megalops cyprinoides* and *Rasbora daniconius* in the order of dominance.

The dense vegetation of the lake coupled with a diverse population of planktonic forms make the lake a favourite haunt of cotton teals. About 400 cotton teals can be easily seen in a single sighting, gliding on the lake's surface during the migratory season. The lake is also home to pintail ducks and coots. The resident birds patronizing the lake include egrets, dabchicks, jacanas and herons.

Santa Monica Lake — The Santa Monica Lake ($73^{\circ}57'N$ & $15^{\circ}31'E$), located in the industrial campus of Syngenta India Ltd., is a perfect example of existence of harmony

between economics and ecology. The lake consisting of 2 parts separated by a metal road is a permanent man-made water body. The lake waters have a high concentration of chlorides, probably owing to the seepage of saline waters from the neighbouring Banastarim River, mainly during the peak of summer. The company management sustainably uses the lake water for cooling of industrial machinery. The lake's total hydrophytic vegetation, consisting of 5 species of macrophytes, covers only 30% of its surface with the emergent, *Polygonum glabrum* being the most dominant.

The clear, open waters of the lake are conducive for the growth and development of a variety of both phytoplanktonic as well as zooplanktonic forms. 11 species of phytoplankton and 19 species of zooplankton inhabit the lake waters. Among the phytoplankton the Cyanophyceae, *Oscillatoria formosa* is the most dominant. Naupliar larva followed by the copepod *Cyclops bicuspidatus thomsi* dominates the zooplankton. The balanced hydrophytes and varied plankton sustain a diverse population of benthic fauna comprising of a total of 6 macro-invertebrate species with *Chironomus* larva being the most dominant. Although *chironomus* larva is considered as an indicator of eutrophication, at Santa Monica Lake, the particle size of the loamy substratum decides the type of benthic community.

The clear deep waters of the lake, diverse planktonic community and adequate benthos together sustain fish species like *Rasbora rasbora*, *Barbus amphibius* and *Etroplus suratensis*, in that order of dominance.

Annually, the lake is home for a large number of resident as well as migratory waterfowl. Lesser Whistling Teals, their number reaching upto 1500, dot the periphery of the lake during the migratory season. The deep waters, diverse plankton and benthos and the substantial fish population in unison support the long-legged wading birds like herons and storks.

Santa Monica Lake boasts of the state's only mixed, communal heronry. Cormorants, darters, purple herons, night herons and egrets share the heronry site during the monsoons for their breeding activity. This traditional heronry speaks volumes of the security experienced by the birds within the industrial complex.

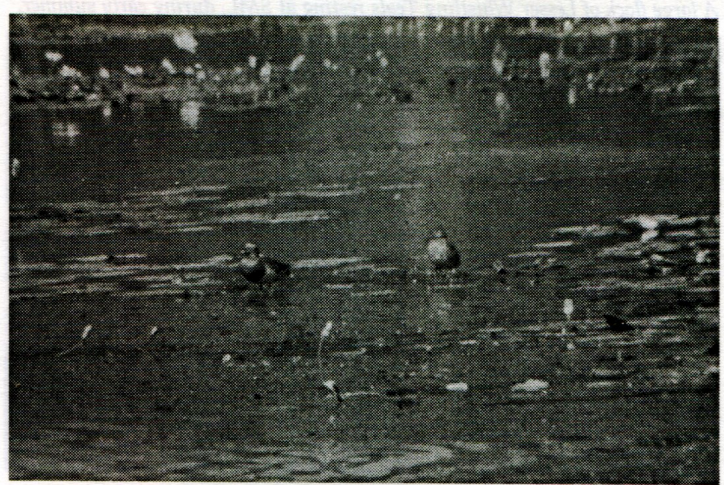
Threats and Recommendations — Oblivious of their multifarious benefits, these enchanting lakes with bustling biodiversity appear to be in the grip of severe



The view of Carambolim Lake in the flooded state from southeastern side. The railway station and the rail embankment can be seen in the background.



A flock of Open Billed Storks back from their feeding rounds preparing to roost at Santa Monica Lake

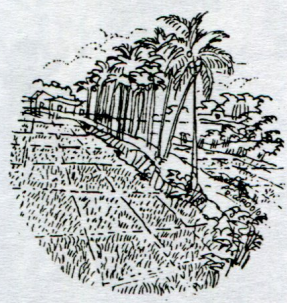


The Lesser Whistling Teal, and a rare winter visitor to the lake , the Blue Winged Teal are seen resting.

A Comparative Status of Avifauna during 1996 and 1997 at Carambolim Lake

Avifauna (Cumulative Total)	1996	1997	%Change
Total	11,623	26,117	+225
(22)			
Waterfowl	11,318	25,590	+126
(8)			
Water Visitors			
Pintail	3,449	15,187	+340
Lesser Whistling Teal	2,736	4,957	+81
Coots	718	347	-52

Note : Figures in parenthesis represent the number of additional species of birds newly sighted during the year.



Distribution of Birds at Pilar, Carambolim and Santa Monica Lake from Jan 1996 to Dec 1997

	Bird Community	PL	CL	SML
Habitat	Terrestrial	6.43% (36)	1.51% (54)	6.43% (93)
	Aquatic	94.38% (31)	98.50% (38)	93.56% (48)
Habits	Waders	15.25% (19)	22.23% (20)	39.77% (32)
	Swimmers/Divers	83.34% (8)	77.68% (9)	59.83% (7)
	Skimmers	0.89% (4)	0.07% (6)	0.39% (9)
	Insectivores	9.64% (8)	8.67% (4)	33.71% (11)
Food Habits	Herbivores	83.75% (10)	84.37% (12)	12.04% (4)
	Piscivores	6.18% (8)	6.76% (11)	51.98% (17)
	Carnivores	0.16% (1)	0.19% (4)	2.25% (12)

Note : Figures in parenthesis represent total number of species.

problems threatening their very existence. It is about time that we come out of our apathy towards these lakes. Some of the threats common to the lakes in general and the other specific issues pertaining to the individual lakes as listed below deserve special attention from managers and the well-meaning public alike.

Weed Infestation — As of today the most serious threat of the lakes in the state seems to be weed infestation in the form of a pteridophyte, *Salvinia*. The *Salvinia* weed has presently created a severe ecological imbalance in most of the fresh water lakes in the state. The increased input of organic nutrient into the lakes owing to surface runoff, washing of cattle, and night-soil generated by the floating population facilitate the luxuriant growth of the weed. At Carambolim Lake the wash-down from soiled food package dumps along the edge of the railway station might be adding to the problem. If an immediate solution is not effected, it will not be long before the lakes are converted into a single mass of *Salvinia*. This will leave little or no open space for the waterfowl, thereby making them strangers in their own land.

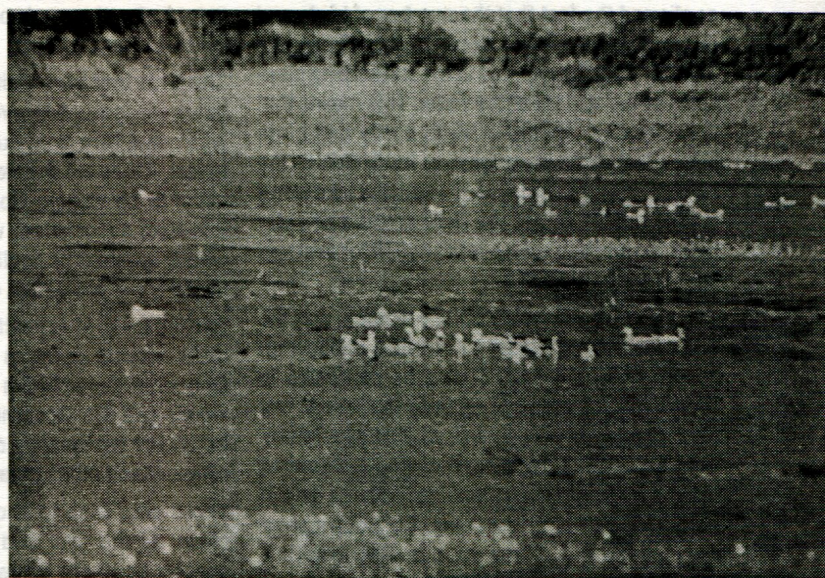
Siltation — Ageing and death of water bodies left to themselves is a natural phenomenon. The excessive silt generated in the water body itself and that imported through the surface runoff from the torrential rains hasten the process in the tropics/subtropics. Therefore, planned and regulated de-siltation needs to be a regular step to prolong the life of these lakes in healthy state. Unlike the Santa Monica Lake, de-siltation is not carried out at Carambolim and Pilar lakes. These lakes need to be de-silted at regular intervals of 4 to 5 years, in a phased manner, thereby maintaining the natural gradient of the lake bed.

Human Interference — The Pilar and Carambolim Lakes are faced with problems of encroachment and human interference. A buffer zone of 50-100 m, if demarcated and strictly maintained along the entire contour of the lake, will go a long way in minimizing the problem.

Regular Maintenance — The embankments of Carambolim Lake are plagued with breaches. These need to be strengthened and widened so as to serve as trails for bird watchers. If *machans* are erected at vantage points overlooking the Carambolim Lake and the Santa Monica Lake, it would provide the birdwatching enthusiast with many an enchanting view of the lake. This may also promote eco-tourism in the state.

Area of Wetlands (in sq km)

Pernem	2.70
Bardez	5.22
Bicholim	0.25
Sattari	0.10
Tiswadi	3.97
Ponda	3.25
Mormugao	2.20
Salcete	6.70
Quepem	0.97
Sanguem	0.32
Canacona	0.07



Flocks of Cotton Teals, the dominant local migrant at Pilar Lake, engaged in uninterrupted feeding on the submerged vegetation.

The Shiroda Wetlands — Situated in Ponda taluka, 40 kms away from Panjim city, the wetlands consisting of marshy land are fed by numerous springs from which the water is drained to the rice fields on the west, passing through bunds built over the years. The area is between two low-lying hills bunding the water body, which is about 10 hectares in size. The narrowness of the water body, flanked on the north and south side by horticulture plantations of coconut, arecanut and other fruit bearing trees like mango, cashew and kokum with sparsely populated timber trees like *sal*, *matti* and *kindal*, in addition to dense human settlements, appears to make the site not a regular migratory landing ground but only a buffer ground in the event of increased bird population pressure at Carambolim site. The interest in this site therefore centres around supplementary improvements to make the landing grounds more attractive to migratory birds, since flights of birds have been reported to be landing in this area in the past.

Text (except Shiroda wetlands), pictures and tables by Sonali D. Borges & A. B. Shanbhag, Department of Zoology, Goa University. Additional photographs and tables are from Renu Walia, Limnological Studies...(see bibliography).

Killer Weeds threaten Karmali Lake

Carambolim Lake is locally called Karmali Lake, and is known worldwide as a major birdwatching site. In the last few years, however, the lake has been engulfed by the *salvinia* weed and the situation has worsened steadily. Due to this, the number of birds and ducks coming from eastern and central Europe and central Asia, particularly in the winter, and also of indigenous birds has decreased substantially. If the lake is not cleaned on a war footing, it is going to be lost to Goa forever, and this tourism friendly, tiny state would lose one of its prime eco-tourism sites.

Gordon Frost, an Englishman who has been visiting the lake for the last seven years has also confirmed the fact that the number of birds and ducks is decreasing. According to Frost, the *salvinia* weed has spread like a suffocating blanket over the surface of the water. This means that the ducks are unable to swim easily and birds have great difficulty acquiring food. Due to the ten centimetre thick layer of weed, the lake water is also unable to get the right amount of solar radiation and this is also responsible for destroying the vegetation.

Pareesh Parob, honorary wildlife warden, was the first to take the initiative to mobilise public support to clean the lake. Today, he continues to spearhead the crusade against the weed. 'We Care' (a voluntary organisation), 'Nisarga Nature' from Mapusa and 'Southern Birdwing' have united to conduct a common campaign. With the help of schoolchildren and local youth, the group started cleaning the lake off the weed on Republic Day, 2001. Three truckloads of weed were removed from the lake on that day. Five more truckloads of weed were removed the following week. But there is still much to be done. The volunteers need instruments like big nets, boats, ropes, person power and, of course, funds to carry out the work. They have plans to do this work every Sunday.

F.L. Coelho, Assistant Conservator of Forests, disclosed to the media that his department does not have legal rights over the lake. Attempts were made to enter into an agreement with the local Comunidade for the development of the lake into an eco-tourism spot. The Department even prepared a plan which has so far only gathered dust since, according to the Department, the local body is unresponsive.

Indian culture has always been sympathetic to the needs of birds. As Carambolim shows, not any longer perhaps. Human beings today have become fairly notorious for looking after their needs first, and only thereafter—if at all—willing to look after the needs of other species including birds and animals.

The birds that have visited Carambolim over the years are as much in love with Goa as the tourists who come here from Europe or the rest of India. In fact, if they are deemed tourists, then they can claim to be visiting Goa for centuries! Despite this long association, we remain today almost wholly ignorant or negligent of their needs, particularly the protection of their habitats.

Wildlife looks after itself. All that we have to do is make serious attempts to look after its habitat. Only when Carambolim Lake is stripped of all its weeds can the Government, NGOs and everybody else legitimately claim they love the environment and all its creatures.

Those who wish to know more of the effort to clean up the lake and wish to join it should contact Southern Birdwing at the following address:

Southern Birdwing,
94B, Bairro Forta Vaddo,
Nerul, Bardez, Goa 403 114
Tel: 401814/402957

Sanjay Dhavalikar

Carambolim Lake choking with *salvinia* weeds.



Map of Quitula

The map of Quitula (*facing page*) was prepared, as I had a great urge for knowledge, not of any kind in general but about the place of my birth, the place where I was brought up, studied and lived my young days.

In my student days we were taught histories & geographies of Great Britain, India and other parts of the British Empire, and we knew nothing about our own places—villages and towns which are steeped in history and geography. This aroused my curiosity and interest.

I started the great search first in my own family and home gradually moving out to our neighbours and other villages like Aldona. The perceptions will not end, it is an on going process and has to be recorded. This could best be done by a map of the village for only a map could hold all.

I was attracted to this idea, as I had some ability in drawing.

So I decided to have a 'map of Quitula' that will show the configuration of the village with all its features. It is an amateurish effort, in which a lot of hard work has been put in to make it as precise as that of a cartographer's.

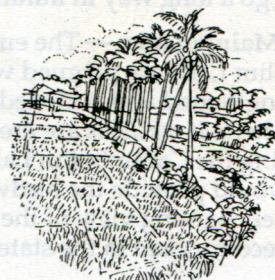
The principal source of information in this effort of mine has been a set of maps of the lands of the Comunidade in possession of the Comunidade of Aldona.

In addition, lot of field work had to be done to ensure accuracy by traversing the length and breadth of Quitula, through its hills and fields, roads and *bunds*, lanes and by-lanes to study the features and peculiarities of the face of Quitula. However all the perceptions could not be accommodated in the limited space of the map.

The map was done between 1960 and 1970 in the spare time I could find for this hobby. The features keep on changing—as I said before, it is an ongoing process. One has to keep track to bring it up to date. It's a beautiful place!

Henrique T.A.S. Fernandes

Henrique Fernandes died after the first edition of *Fish, Curry and Rice* was published. We continue to carry his elaborate map of Quitula not only because it was a labour of love, but also because it aptly shows the vast and intricate connections that exist between land, sea and rivers in Goa and the engineering marvel of the khazans in the area. Quitula is a small village in North Goa, part of the Aldona village panchayat area.





AGRICULTURE : A HISTORICAL INTRODUCTION

The statistical report on the Portuguese settlements in India, extracted in the year 1850 by Captain Kol, has the following to say about the condition of agriculture in the district:

Agricultural Products: The principal articles are five—rice, salt, coconut, betelnuts and nachne; those of the second class are *urid*, *culit*, *tori*, *pacolo*, mug, beans, *sandom*, potatoes, chillies, round and long onions, *girgilim*, coffee, cotton and hemp.

Agricultural Implements: The implements used in agriculture are few, namely, the plough, rake, hatchet, mattock, *Divolo* (a mallet to break lumps of earth), and *Oloi* or *Guto*, a board used for levelling the ground.

Agricultural Charges: The expense of growing rice in sweet and salt ground is calculated generally at one-third of the value of the produce, but in high sandy lands, the produce in coconut carts at one-fifth, in betelnut carts in some places at a half and in others at one-third.

Fruit: Fruit is of two kinds, wild and garden. Amongst the first are the bulls eye, *jagomas*, white jambos, *babolans*, *carandans*, *balcas*, guavas, *cajus*, *jambolans*, *churnas*, etc. Amongst the second are custard apples, melons, *moquins*, pomegranates, watermelons, *papaya*, citrons, oranges, tangerines (*sonaringas*) pumeloos, Malacca Jambos (*churnas*).

Wild and Garden Flowers: The indigenous flowers are various; some are wild, and others are produced in gardens; they are both much in demand in the markets, particularly by the Hindus. The most common of the wild flowers are *cul-champins*, *nag-champins*, *onvolans*, *surgans*, *madercilvas*, *candolans*, *abolins* (sky-blue, white, yellow and purple), *undans*, *coasso*, or *ato*, *comolans*, *salcans*, etc. From gardens, *zaiznios*, *nentios*, *mogarins*, *bhui-champins* (these grow like mushrooms), *dore-mogarins*, *xiuntins* (various), roses (various), buttons (white and purple), *perpetua*, *abolins* (carmine and light red, also gold colour), *pat of pach*, *alexandria* (various), etc.

Vegetables: Vegetables are various and abundant, especially in the rainy season. They form the principal food of the Hindus. Those most cultivated are blites, *bretalhas*, radish, parsley, *tendulins*, pumpkins, *bendes*, cucumbers, yams, *caratins*, *cualengas*, *nol-kol*, salad, etc.



Paddy field ready for harvest in September



Women harvesting paddy



Cut paddy is stacked in neat circular heaps prior to threshing

Comparative Land Use

S.N.	Items	Land Use (1988-89)	Land Use (1997-1998)
1.	Total Geographical Area	361113 (100)	361113 (100)
2.	Forest	105294 (29.1)	125473 (34.7)
3.	Land not available for cultivation	33137 (9.2)	37137 (10.28)
4.	Pastures and grazing lands	1305 (0.3)	1305 (0.3)
5.	Land under miscellaneous tree crops and groves	580 (0.2)	580 (0.2)
6.	Cultivable waste lands	80099 (22.2)	55683 (15.4)
7.	Net sown area	140698 (39)	140935 (39.02)

Rice Production in Goa (1876)

	Ilhas	Khandis	Kuros
Velhas	Salcete	120,809	0
Conquistas	Bardez	109,153	10
Novas	1 st Division	34,297	0
Conquistas	2 nd Division	28,949	0
	3 rd Division	17,155	16
	4 th Division	11,388	11
	Total	443,170	37

Besides there are several others, proper for the use of animals, and also for dyeing purpose.

The position of agriculture as it then stood is reproduced below:

For upwards of two centuries and a half since the conquest of Goa by the Portuguese, agriculture met with little or no encouragement from government, but continued to demand, as heretofore, the solicitude of the village committee. About the same period the religious orders, and preeminently among these the Jesuits, who had now become possessed of large landed estates, imparted some impulse to the cultivation of land, especially to the planting of coconut trees on which subject the latter have left an excellent treatise, entitled *Arte Palmarica*.

As the land subjected to agriculture was, however, limited, the production of rice was always found to be insufficient for the maintenance of the entire population of the country, which was besides, now and then visited by a famine. To supply this deficiency, and, above all, to mitigate the terrible sufferings attendant on seasons of scarcity, the government, though remiss in matters relating to agriculture, evinced its concern for the comfort of the people by importing large quantities of grain from the neighbouring places at the expense of the Municipal chambers, and storing it in public granaries (*celleiros*), as well as by imposing on the village communities the obligation of supporting the poor people residing in their respective districts.

The celebrated Marquis of Pombal was the first Portuguese statesman who took seriously into consideration the subject of improving the agriculture of Goa and with this object, issued in 1771, the necessary instructions to the local executive authorities. Five years from this date the post of Superintendent of Agriculture (*Intendente da Agricultura*) was created, whose duties were to suggest and carry out such improvements in the cultivation of lands in each village as were deemed most essential. The result did not, however, answer fully the expectations entertained, but still it was satisfactory to find that the produce had palpably increased. In 1729, the quantity of rice grown in Ilhas, Salcete and Bardez was 9843 *khumbos* 16 *khandis* 17 *kuros* (41,343,038 ° lbs); in 1777 there was an increase of 1827 *Khumbos* (7,673,400 lbs), and in 1805 of 2350 *khumbos* 3 *khandis* 15 *kuros* (9,870,787 ° lbs).

Since this time, agriculture has made steady progress in the country and forms at present its chief industry. Of the entire territory of Goa, a comparatively small portion, consisting of 234,754 acres, is stated to be under cultivation. Out of these, rice occupies 122,566 acres; other cereals, vegetables, etc., 77,066; coconut trees 33,194; areca palms 565; and fruit trees the remainder. The soil is chiefly argillaceous, but also contains light sand, and more or less of decayed vegetable matter. In many parts it is full of stone and gravel. Its fertility varies according to the quality and situation of the land, the supply of water and the employment of labour. Manure, consisting of ashes, fish and animal excrement, is largely employed as a fertiliser of the soil. As a rule, the *Velhas Conquistas* are better cultivated than the *Novas Conquistas*, owing chiefly to the want of personal security in the latter, which are exposed to the frequent depredations of dacoits. In both these divisions, a holding of fifteen or sixteen acres is considered to be a pretty good farm, though the majority of holdings are of small extent.



Freely available solar power is used to dry the paddy after threshing

The staple produce of the country is rice (*oryza sativa*), of which there are two crops—one the winter crop, called *sorodio*, and the other the summer or *vangana*, raised by means of artificial irrigation from the rain water accumulated in reservoirs, ponds and wells. As to the former, the field is generally ploughed before the commencement of the monsoon, the seed scattered in May or June, and the crop harvested in September; while as regards the latter the ploughing operations begin in October, the sowing in November, and the harvesting in February.

Rice is cultivated on low lands, *cazana* or *cantor*, situated near the banks of rivers; the slopes of hills, *mollo*; stillgrounds *dulpam* or *dulip*; and sandy soils, *quero*; in consequence of which various kinds of seeds are sown. The ratio of the produce to the seed is as follows: near the banks of rivers it is ten to one, in dry and still soils six to one, and in other places eight to one, more or less. The quantity of rice produced is sufficient to meet the local demand for only two-thirds of the year. The cost of cultivation is calculated in some places at one-third, and in others at one-half of the value of the produce.

The table given above shows the quantity of rice produced in early district of Goa in the rainy season of 1876 (a *khandi* being equal to 266 lbs).

Next to rice, the culture of coconut trees (*Coccoloba nucifera*) is deemed most important, owing chiefly to the variety of uses to which their products are applied. They grow abundantly in beautiful groves on all lands not hilly or serviceable for the production of rice, and along the sea coast, which is finely fringed with them. Hilly places and inferior soils are set apart for the cultivation of such cereals and pulses as *nachne* (*Eleusine coracana*), *urid* (*Phaseolus radiatus*), *culit* (*Dolichos uniflorus*), *orio* (*Panicum miliaceum*), *mug* (*phaseolus mungo*), and *tori* (*Cajanus indicus*); or fruit trees, the most important of which are the mango—*ambo*—(*Mangifera indica*), the jackfruit—*ponos*—(*Artocarpus integrifolia*), the cashew—*caz*—(*Anacardium occidentale*), and the plaintain—*quelmo*—(*Musa paradisiaca*); of oil and fibrous plants, as *till* (*Sesamum indicum*), *son* (*Crotalaria juncea*); and of various kinds of vegetables, as potatoes (*Convolvulus batatas*), radishes (*Raphanus sativus*), yams (*Dioscorea sativa*), ladyfingers (*Abelmoschus esculentus*), melons (*Cucumis melo*), watermelons (*Cucurbita citrillus*), cucumbers (*Cucumis sativus*), pumpkins (*Cucurbita pepo*), bottle gourds (*Cucurbita lagenaria*), and snake gourds (*Trichosanthes anguina*). Besides these, chillies (*Capsicum frutescens*), ginger (*Zingiber officinale*), turmeric (*Curcuma longa*) onions (*Allium caepa*), and certain vegetables of daily consumption are extensively cultivated in some villages. In the province of Sattari, enterprising foreigners rented

some years ago from government certain plots of ground for starting coffee plantations. Several experiments were tried, but the results did not prove very encouraging.

Goa is seldom visited with great floods. Some of its provinces indeed occasionally suffer from partial inundations, especially during heavy rains, but no great damage results therefrom to the crops. In times of drought the agricultural classes sustain heavy losses, but the people at large are supplied, though at great cost, with rice from British territories. It is only when a famine occurs in these territories that palpable signs of distress are visible amongst the inhabitants of Goa. Formerly, this country suffered frequently from famines; the years 1553, 1570 and 1632 particularly are said to have been seasons of great scarcity. The condition of the agricultural classes in the *Velhas Conquistas* has of late improved considerably, owing partly to the general rise in prices of all kinds of agriculture produce and partly due to the want of labourers. In the *Novas Conquistas*, however, the cultivators have been reduced to great want and misery through the oppression of the land owners on the one hand, and their own insolvent circumstances and general poverty on the other. As a rule, the tillers of the former district are much more honest and regular in their habits than those of the latter.

THE DECLINE OF GOAN AGRICULTURE

Over the last four decades, assessing the nature of transformations taking place, it would appear to anyone that agriculture in Goa is in a state of steady decline. It still occupies an important position in the State economy, with more than one-sixth of the working population dependent on it. However, in terms of state income, the share of agriculture has fallen from 35 per cent in 1967-68 to about 16 per cent in 1980. The State is deficient in food grains, particularly paddy, and every day newspapers report large conversions of agricultural land to nonagricultural purposes, including fields that have come within the command areas of the Selaulim and Anjunem dams.

Farmers traditionally have adapted agricultural practices in Goa to fit closely the soils and terrain provided by nature. In the Western Ghats, for many years *kumeri* agriculture was practised, and according to informed persons, this was perhaps the only kind of agriculture that was suited to the general ecological

character of the Ghats. Now it is banned because of the requirements of the Forest Conservation Act, 1980.

In the highlands and flood plains, two separate types of agriculture are used. The first is the growing of crops in what are known as *morod* lands, which are basically located in high-lying or terraced fields or along the foothills or top of hills. Such lands are considered relatively less fertile, not amenable to intensive cultivation due to lack of water and other possibilities. The second type of agricultural production is carried on in the *kher* lands which are basically well-drained highly textured sandy soils.

The agriculture of the *khazans* follows its own ecological requirements and is dealt with separately in this report in the section on *khazans*.

The Regional Plan of Goa reduces agricultural activity to two broad categories, namely, cultivated land and orchard land. The area under cultivated land (505.8 sq km) is considerably less than the area under orchards (884.5 sq km). This explains the extensive, almost permanent green cover available in Goa throughout the year. Paddy fields merely add to this green area during the monsoons, thus transforming practically more than one-third of the area to green.

The Surface Utilisation Plan prepared under the Regional Plan proposed an increase in the agricultural land (both cultivated and orchard) from 38 per cent today (1,390 sq km) to 43 per cent (1,555 sq km) by the year 2001 A.D. These are, however, merely plans. As Goa is fast turning into a preferred residential and holiday location, more powerful trends have begun to divert not only agricultural areas but the attention of agricultural workers away from the primary concern of food growing. The Goa Government and its group of ruling politicians has openly encouraged this trend. Large-scale conversions of land were begun under the regime of Pratapsingh Rao Rane, were continued by the regime of Proto Barbosa and assumed scandalous proportions under the reigns of Ravi Naik and Dayanand Narvekar.

Biodiversity: Traditional v/s High Response Varieties

— The need to preserve older varieties of rice, wheat and other crops has been recognised ever since a variety of problems and deficiencies associated with the much-touted High Response Varieties (HRV) hit an unsuspecting globe in the wake of the green revolution. Unfortunately, in many cases the realisation has dawned too late to save such plant genetic resources, and many varieties

Names of Traditional Goan Varieties of Rice

Tiswadi	: Damgo, Babri, Dodig, Kochri, Patni, Corguto, Asgo, Kendal, Sotti, Giresal	(Total: 10 varieties)
Bardez	: Damgo, Babri, Dodig, Kochri, Patni, Corguto, Asgo, Kendal, Xitto, Nermar, Mudgo, Sotti, Shirdi	(Total: 13 varieties)
Pernem	: Damgo, Babri, Dodig, Kochri, Patni, Corguto, Mudgo, Sotti	(Total: 8 varieties)
Bicholim	: Damgo, Dodig, Kochri, Belo, Patni, Corguto, Noxvan, Dongri, Valai, Xitto, Nermar, Mudgo, Sotti, Shirdi, Chagar	(Total: 14 varieties)
Sattari	: Damgo, Babri, Dodig, Kochri, Belo, Patni, Corguto, Asgo, Noxvan, Dongri, Valai	(Total: 11 varieties)
Ponda	: Damgo, Babri, Dodig, Kochri, Belo, Patni, Corguto, Valai, Kendal, Kusalgo, Xitto, Nermar, Runga	(Total: 13 varieties)
Sanguem	: Damgo, Babri, Dodig, Kochri, Patni, Valai, Kendal, Nermar, Odusko, Shirdi	(Total: 10 varieties)
Canacona	: Patni, Asgo, Panyo, Mutalgo, Xitto	(Total: 5 varieties)
Quepem	: Damgo, Babri, Kochri, Belo, Patni, Valai, Kendal, Nermar, Odusko, Padigo	(Total: 10 varieties)
Salcete	: Damgo, Babri, Dodig, Kochri, Belo, Patni, Corguto, Asgo, Valai, Kendal, Kusalgo,	(Total: 11 varieties)
Mormugao	: Kochri, Patni	(Total: 2 varieties)

Output of High Response Varieties

Rabi season 1982- 83 (in kgs)

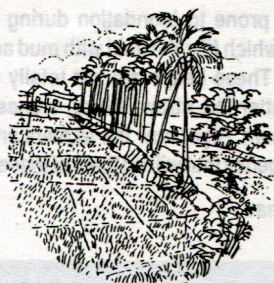
	No. of exp. analysed	Avg yield of dry grains
Tiswadi	11	4111
Pernem	9	3368
Bicholim	27	4035
Sattari	9	4719
Quepem	9	3391
Salcete	28	3996

Output of Traditional Seeds

Rabi season 1982- 83 (in kgs)

	No. of exp. analysed	Avg yield of dry grains
	1	4088
	7	3477
	3	4453
	1	5832
	1	5131
	2	2891

Source : Directorate of Agriculture , Government of Goa, Daman & Diu



displaced by the new seeds are now lost to mankind forever. Worse, this disastrous process is still continuing in many parts of the world. Goa is not exempt.

In the early 1980s, the Directorate of Agriculture, in association with the Zuari fertiliser factory, launched a vigorous campaign to popularise two HRVs of paddy seed: JAYA and CO-3. The basic selling point was 'higher yields'. But no mention was made of the serious problems of these varieties, like their demand for massive inputs, and their susceptibility to diseases.

Like other regions in India, Goan farmers have evolved a series of rice varieties that are suited to Goa's peculiar composition of soils, climate and rainfall, and also provide better nutrition and taste. For example, the *corguto* and *asgo* are generally planted in *khazan* lands, taking about 105 to 115 days to mature. The *dovi* or *tambripatni* are cultivated in *morod* lands, the *qeendal* and *khonchori* in sandy areas, the *danago*, *khonchori* and the *normar* are planted in 'galley' land, the *dongrem bim* for high fields, and the *xitto* and *xell* are kept for marshy lands, and take about 125 days to mature. The *xitto* (or *xintto*) is also used in the *waingan* season.

There are two ways of improving the yields of one's crop of rice: either one should improve one's own indigenous seed, or one can replace such seed entirely by imported seed. The first method requires training farmers to select the best plants from their crop to keep as seed for the following years. Of course, good crops only grow from soils that are kept fertile with the utilisation of organic manures and have an active microbial population.

Traditionally, many sources of manure including dung and leaf were used. Nowadays, since deforestation has been eliminating the trees, the leaf mulch potential has rapidly declined. Of course, one can also increase yields by providing the farmer with irrigation, so that he can raise more crops or rotate crops using leguminous plants in between. All such practices would involve the native talent of our own farmers, and not require any aid from abroad.

However, since local people are not considered 'experts' in rice farming, even though they have farmed for 40 centuries, planners in India preferred to rely increasingly on the opinions and book knowledge of experts from the International Rice Research Institute. These 'experts' obviously had their own strategies to promote.

Their major objective was to propagate certain varieties of high response rice seeds and to eliminate existing rice

varieties used by farmers everywhere. The figures are quite revealing: There are more than 75,000 rice varieties in the world of which more than 75 per cent are in India. Evidently it is difficult to control any agriculture based on such bewildering diversity. The best strategy for control, therefore, is to advertise a few varieties and propagate them at the expense of local varieties.

In 1984-85, the disadvantages of this approach became clear. The Brown Plant Hopper, one of the major pests troubling HRVs of rice attacked a major portion of the rice crop for the first time in Goa. Losses of between 50 per cent and 75 per cent were reported from the Sancoale area, and Agriculture Department officials said the insect has also attacked rice crops in Bicholim and Chandor. According to the farmers, the appearance of the pest in the Maddel fields of Sancoale village was due to conditions created by the reemergence of effluents from the Zuari fertiliser unit.

Whatever the causes, the appearance of the hopper on a major scale provides devastating proof, if any is necessary, of the weak evolutionary base of the so-called 'modern varieties' and the risk that the farmers expose themselves to when they plant these. Since there is no crop insurance available, the farmers in these areas have to take on the losses themselves.

The introduction of such seed into farmer's fields automatically binds the farmer to the use of more and more chemical fertilisers and pesticides. The increasing use of pesticide poison harms everyone; nature, the river life, the health of the farmer and the consumer. Goan farmers have been sucked into this vicious circle of development by uncritical propaganda done by the Agriculture Department.

Why do we need the traditional or indigenous varieties? For the simple reason that the HRV seeds have little evolution experience. When they develop harmful mutations, they invariably get destroyed. Indigenous varieties on the other hand have a long history of resistance to pests and viral attacks: this is the basis of their survival for centuries. Their germplasm is kept in a living state as crop in the fields.

A significant number of Goan farmers still continue to plant traditional Goan varieties. Data available from the Agriculture Department (*see table*) indicates, that in more than 50 per cent of the samples taken, local varieties were producing better than the HRVs. It is not known why the new seeds were then called 'high response'.

The Awadhis of Madkai

In Goa, Madkai village has one peculiar feature as far as agriculture is concerned. Small heaps of mud spread evenly all over the field immediately attract a newcomer's attention. The history of these mud heaps, locally known as *awadhi* does not go beyond 80-90 years.

The *awadhis* have proved to be a headache for farmers, as they have consumed a major part of the area of their paddy fields. The villagers want the Government to do something to clear these heaps from here. The work had taken off, but was stopped after removal of a few heaps when local landlords objected to the traffic of trucks carrying mud through their territory. The soil removed was used to construct a long *bandhara* across the river close by and also to make mud bricks. Farmers cannot afford to do this job on their own, as it entails heavy costs.

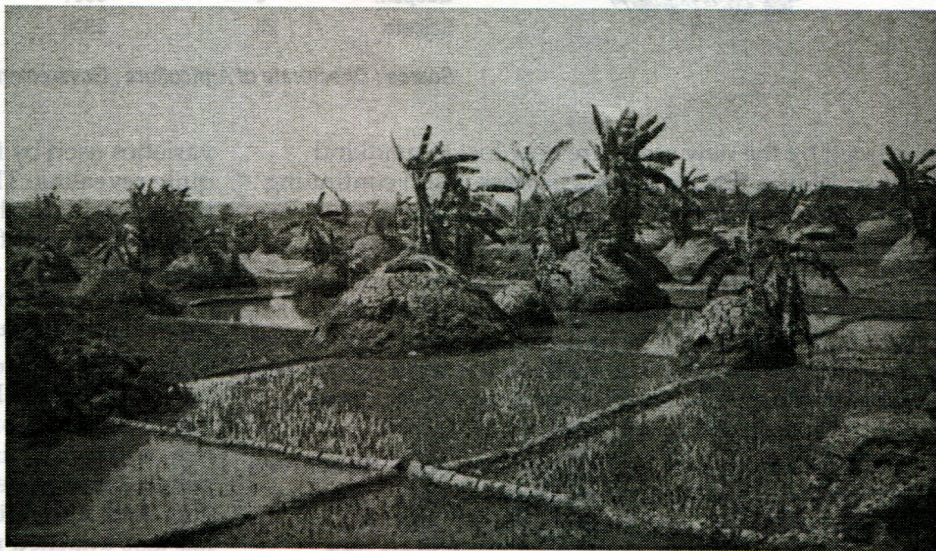
The million dollar question is how the *awadhi* is formed or what makes it to form? The interpretation of local farmers is that inputs like cow dung and dry fish manure when used in bulk create an imbalance in the water-field level. To regain the earlier level, excess soil has to be removed. Although most of the farmers from this area subscribe to this theory, the reason supporting the imbalance is not at all convincing.

There is no doubt that this problem arose due to the difference in levels between the water in the

tank and the fields during the *rabi* season. To bring the field on par with the water level (tank/stream), every year some excess soil was removed, which later became a custom. There are two belts where we find these *awadhis* on either side of the plateau. One is completely irrigated through tanks while the other through a *nallah*. Only on the *nallah* side, the flattened tops of these *awadhis* are utilised to grow vegetables.

Some other factors about these fields are that they are prone to inundation during the rainy season, which fills the field with mud and a lot of rubbish. These heaps are not totally of mud—other matter like straw, sticks, stones are also part of them. Right now the farmers are looking for any agency that will rid them of these mounds.

Niraj Manav



Awadhis of Madkai fields. Excess soil is collected in corners and used to grow banana

The Land Conversion Business

Large numbers of paddy fields are increasingly being converted for either construction of residential estates or the setting up of industries and hotels, especially in the coastal belt.

These conversions mean good business for the ruling clique and, above all, Ravi Naik, who made conversions his one-point programme when he was Chief Minister. However, he was not the first. He was only the most extreme!

Replying to a question in March 1990 just before his government was pulled down, Pratap Singh Rane admitted in a written reply in the Assembly that between January-December 1989, 55,72,747 sq m were converted in the Regional Plan from orchard, natural cover and agriculture to other development purposes.

Of this, a total of 3,00,281 sq m of agricultural land was converted for beach resorts in the command areas of the Selaulim dam. This is despite the Regional Plan being notified as late as December 1986.

Larger areas have been converted thereafter. For example, from April 1, 1991 to October 31, 1991 the area converted was: North Goa District: 5,87,200 sq m; South Goa District: 1,98,739 sq m.

From November 1, 1991 to January 31, 1992, area converted was 2,51,191 sq m.

From January 1991 till November 1992, area converted was 49,03,519 sq m.

It is quite apparent from these figures that the government and the administration has been actively supporting the destruction of agriculture in the last decade.

This is the very same administration that has spent more than Rs 110 crores on the Selaulim dam and has today spent many more crores on construction of the Tillari dam. One should therefore assume that these projects, though on paper related to providing irrigation for agriculture, are being executed for other purposes, including the siphoning of large amounts of public funds.

The Tata Energy Research Institute, as a result of its pilot project on natural resources accounting in Goa (Phase I), has completed an assessment of the extent of agricultural land conversion in different talukas in Goa for the period 1991-96. The survey has established that almost 65-75% of agricultural land conversion was for residential purposes with the exception of Sanguem Taluka which is a major mining area. Among the coastal talukas Tiswadi, Bardez and Salcete had high land conversion rates with 1.7%, 1.2% and 0.2% of the net area sown converted to non-agricultural purposes. The study links this with the massive arrival of tourists in these areas. Quepem had the lowest conversion rate.

The study also indicated that official land conversion figures from the Agricultural Dept. did not present the entire picture as the land requirement

for the Konkan Railway Project (776.59 ha as per KRC records) did not appear to be included in the official figures. The RITES (1992) study indicated that 782 ha of land were to be acquired for acquisition (37 ha forests, 202 barren land, 290 ha cultivable land, 140 ha orchard and 10 ha).

For data relating to land use changes due to mining activity, it is best to consult the TERI study 'Areawise Environmental Quality Management Plan for Iron Ore Mining areas of Goa'. The study was conducted in 4 clusters of villages in Salcete, Bicholim and Sanguem Talukas and indicated large-scale expansion of mining activity in the concerned villages for a period of 10 years (1988-1997). 635 ha were covered under mining pits during the period with an additional area requisitioned for mining dumps. A total of 1045 ha including forest and agricultural land were brought under mining activity. TERI concluded that mining activities were causing large-scale land use changes in Goa. As stated earlier, the land use changes involving agricultural and orchard sourced to Konkan Railway and mining are not shown in the official regional plan changes whose record is maintained by the Town Planning Dept. It would appear that all these changes are unwise and illegal and have been conducted with full knowledge of the government.

THE KHAZANS

Ancient Indian mythology has it that Goa was reclaimed from the sea. *Puranic* legend tells of how the sage Parashuram (considered to be the sixth *avatar* of the god Vishnu) crested the mighty Sahyadri ranges and let fly an arrow into the western seas to create *Gomantak* or *Govarashtra*. The Sahyadri foothills, plateaus and spurs are very much part of Goa's topography to this day. But the *Purana* obviously equated Goa with—or rather, defined it as—its *khazan* lands.

Looking back through the aeons, it does seem the legend writers were perspicacious. Not only were the *khazans* those parts of Goa which made civilised life possible in those times, but they also have cradled and nurtured well nigh all its power centres, spiritual and temporal, its culture, development and commerce from hoary years BC to the current century!

It seems obvious today that Parashuram's mythical arrow was his legion of land-hungry agriculturist followers who descended the western slopes of peninsular India to Goa's tidal estuarine seaface. And, historians aver, it was these settlers who reclaimed the land and created the *khazans*, made contact with the seafaring Sumerians and set Goa on its long voyage through world history.

Indeed, through the centuries, the *khazans* have been host to and stage for Goan life, from the times of the Bhojas (circa 200 BC), through the Konkan Mauryas (500 AD), Goa Shilaharas (900 AD) Goa Kadambas (1000 AD) and Bahamanis (1300 AD) to the Portuguese (1510 AD). Apart from the temporal, the *khazans* have nurtured great spiritual kingdoms too, what with the 'Kashi of the Konkan' centred around Naroa, Divar and the 'Rome of the East', now Old Goa, both flowering in their lap.

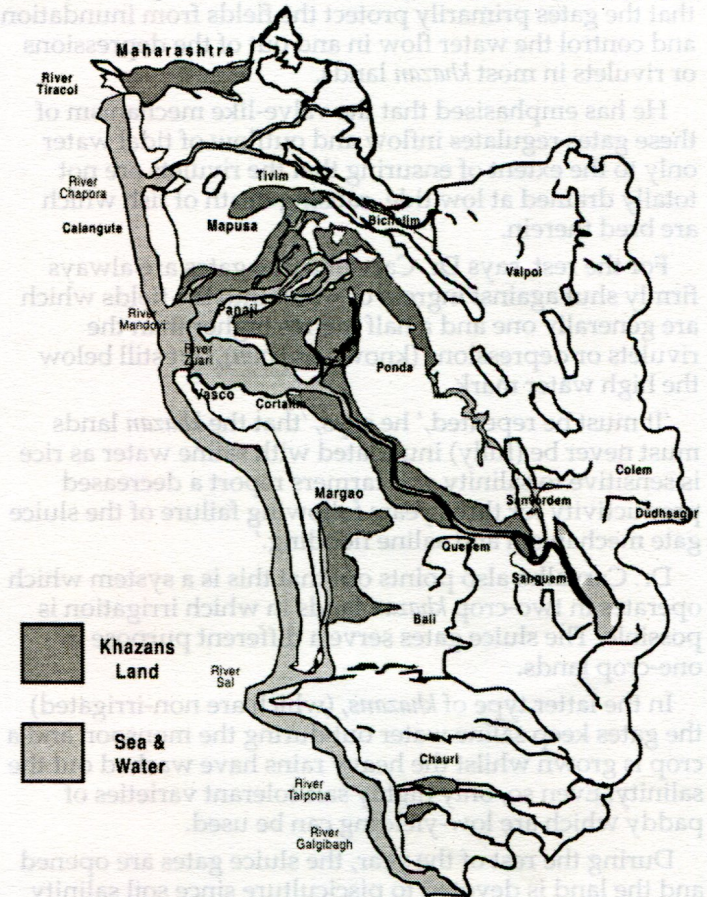
The Engineering Marvel of the Khazans—The *khazans* are saline flood plains in Goa's tidal estuaries (below sea level at high tide) which have been reclaimed over centuries with an intricate system of bunds (dykes) and sluice gates.

The bunds forming and protecting the *khazans* against the ocean (and river) tides run into about 2000 kms—well nigh the distance between tiny Goa and New Delhi! They form the largest community-owned asset of Goa. As the late chartered civil engineer, Urban Lobo put it, they 'can be estimated as an achievement of Goan sweat and labour equal to about 10 (Egyptian) pyramids.'

The Agricultural Land Development Panel (ALDP) report pointed out: 'Environmental compatibility of the defence structures was made possible by using locally available, cheap, and recyclable materials such as, mud, chopped straw, mangrove litter and branches, laterite stones, bamboo or arecanut logs, etc. These structures were made on the basis of tidal cycles, water currents, wave energy, sediment load and anticipated increase in floodplains.'

'Since the erosive effects were highest near the external embankments, such constructions employed dressed, partly dressed or undressed locally quarried laterite stones. This was a sound choice because laterite is abundantly available in all grades, could be easily transported in cart loads and the stone hardens when exposed to saline water. "Boring" organisms have no detrimental effect on laterite.'

Khazan areas of Goa



'The outer embankments are linked to the second line of defence, the inner embankments or *bunds*, mostly built in mud, straw and *pal* (poles). The inner embankments are further divided into "girdle type", undulating and wide bunds and interconnecting smaller bunds. The smaller bunds regulate the level flow and circulation of river water or monsoon water.'

'The sluice gates are vital to the ecology of the *khazans* which is dependent on the dynamic variation in water salinity from near zero ppm in the springs flowing from the hills and 35000 ppm in the river water flowing in from the sluice gates.'

'These gates are strategically located depending on the contours and relief of the land, elevation at the point of smooth inflow and outflow of saline water. The wooden shutters need infrequent supervision except when their life is reduced owing to the action of "wood-boring" organisms.'

The wooden shutters open and close with the pressure of the tidal flow under normal circumstances. Depending upon the strength of tidal flow, these shutters are installed *in situ* in naturally carved laterite weirs or specially made laterite/RCC built weirs. A majority of the shutters are supported by gates built with laterite and mortar/cement.

Peter Carvalho from Cortalim, who has spent much of his life near the *khazans*, has made a good attempt to clear certain prevailing misconceptions about how the sluice gate system functions.

Denying the widely held belief that 'the gates which operate on tidal power provide the *khazans* with tidal

flushing four times a day,' Dr. Carvalho has pointed out that the gates primarily protect the fields from inundation and control the water flow in and out of the depressions or rivulets in most *khazan* lands.

He has emphasised that the valve-like mechanism of these gates regulates inflow and outflow of tidal water only to the extent of ensuring that the rivulets are not totally drained at low tide, causing death of fish which are bred therein.

For the rest, says Dr. Carvalho, the gates are always firmly shut against ingress of water into the fields which are generally one and a half metres higher than the rivulets or depressions (known as *poim*), but still below the high water mark.

'It must be repeated,' he says, 'that the *khazan* lands must never be (fully) inundated with saline water as rice is sensitive to salinity and farmers report a decreased productivity for three years following failure of the sluice gate mechanism and saline flooding.'

Dr. Carvalho also points out that this is a system which operates in two-crop *khazan* lands in which irrigation is possible. The sluice gates serve a different purpose in one-crop lands.

In the latter type of *khazans*, (which are non-irrigated) the gates keep saline water out during the monsoon and a crop is grown whilst the heavy rains have washed out the salinity. Even so, only highly salt-tolerant varieties of paddy which are low-yielding can be used.

During the rest of the year, the sluice gates are opened and the land is devoted to pisciculture since soil salinity rises after the monsoon.

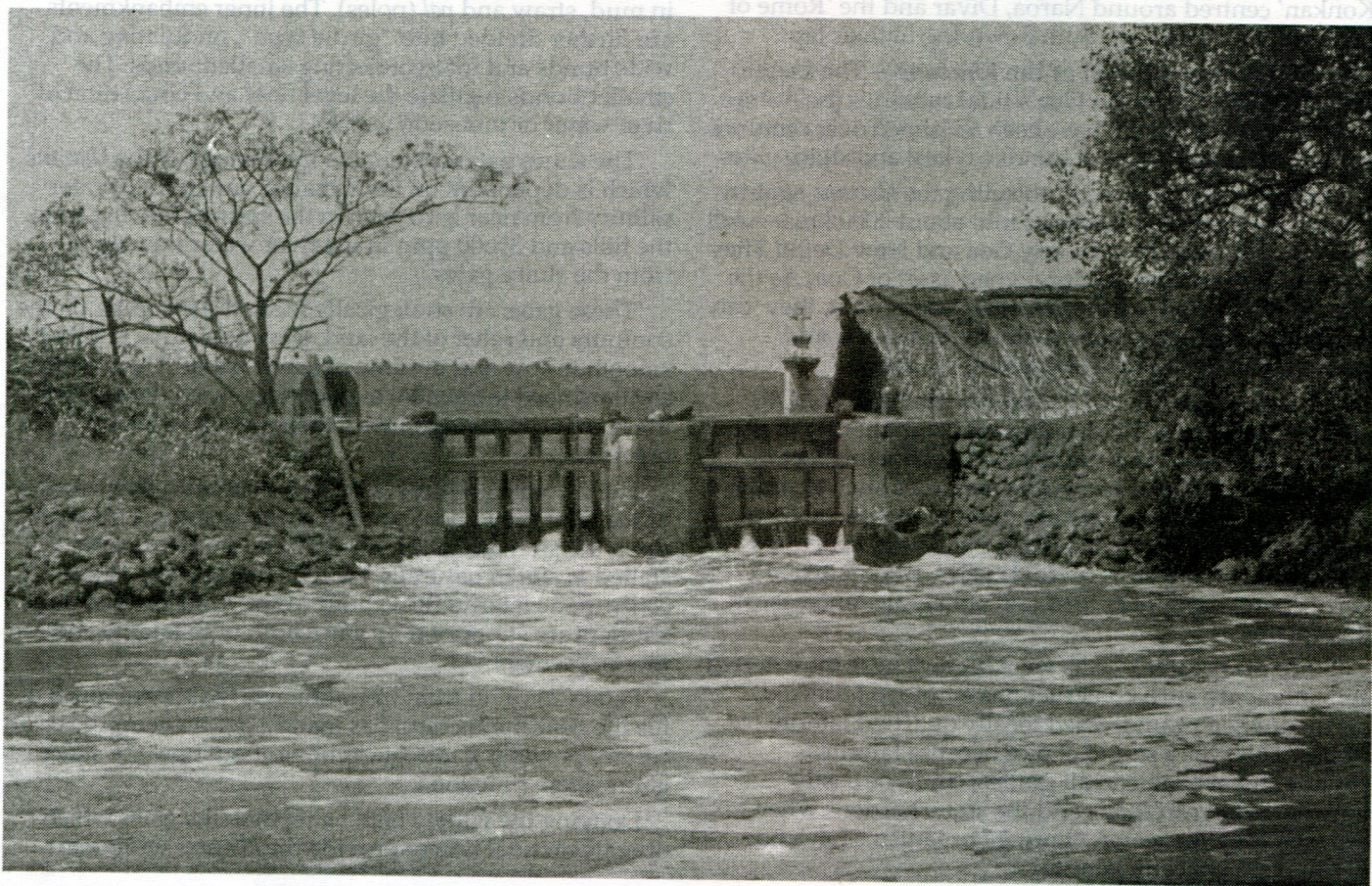
Declares Dr. Carvalho: 'The major importance of the *khazan* lands is their great adaptability for both agriculture and pisciculture, as economic, social and other factors demand. No other land in the world has this great adaptability.' He warns: 'These lands also serve as emergency storm water receptacles. If this land is destroyed or filled up, flooding (in the surrounding area) is bound to occur. Hence this land cannot and should not be touched.'

The most important natural anti-erosive barrier is provided by the mangrove vegetation near the external or internal bunds. Mangroves act as wave breakers and reduce the net erosive energy of the tidal waves. This property was well known to the *khazan* land farmers though no intentional planting of mangroves was undertaken. However, the mangroves which colonised and stabilised near the embankments were protected and nursed. This tradition could keep the mangrove forests as well as the *khazan* lands close to these alive, due to community interest. The following information about *khazans* is taken from the ALDP Report:

'*Khazan*' is a term commonly used in Konkani and Goa for coastal saline soils. These soils are found in the agro-climatic zones No. 11 and 12, on the East and West-coast of India. In Maharashtra, similar soils are known as '*Khar*', '*Kharvat*', '*Khazan*' and in Karnataka as '*Gazzani*' and in Kerala as '*Pokkal*' and '*Chemeen Kattu*'.

The landscape of Goa as seen today is partly engineered by the ancient settlers who reclaimed the marshy lands in the floodplains of Goa's major rivers and estuaries. References to, old *khazan* lands are found in land-grants of ancient rulers of Goa, such as Prithvimalla

Manus at Cumbarjua canal. The water is entering the *khazan* from the river in the background





The only sluice gate at Carambolim on its southeastern side, which is used for regulating the water supply for irrigating the paddy fields



The canal supplying water from Carambolim Lake to the paddy fields



Paddy saplings being readied for transplantation

Varman (400 A.D.), Anirjitvarman (500 A.D.), Gandagopala (1106 A.D.), which mention *khazan* fields of Divar Island and Ponda taluka. There was a tradition of naming the newly reclaimed *khazan* lands after the reclaimers. The first piece of *khazan* lands brought under cultivation in Madkai Village of Ponda taluka by 'Maddo' and 'Pay' were named as *Maddyache-mulak* and *Payche-mulak*. Cultural historian, Anant Dhume, Ex-Director of Land Survey, has shown the evidence of the involvement of Havig Brahmins in building of lateritic drainage canals of the *khazan* lands of Old Narve at Divar Island. From these accounts, it appears that marshy lands reclamation and drainage canal/sluice-gate construction technologies were well developed in ancient Goa. Massive external and internal embankments were constructed using cheap, locally available, durable

material for reclamation of lands today known as *khazan* lands. Certain professional managers called *Kamat*s were entrusted by village-communities with the task of maintenance of these embankments and this profession is known as *Kamatpon*.

The village communities, *Gaunkaris*, or comunidades had appointed voluntary bodies called *Bous* for specific task related to *khazan* land protection. Besides, the kings had appointed revenue and land-tax collectors called *Bhojakas* and *Ayuktakas* to mobile the revenue for *khazan*-land production.

The ecology of Goa's *khazan* lands — 'Ecology' implies the interdependence and interrelationship between different organisms or groups of organisms including the plant kingdom within their environment. The word 'environment' mostly refers to the physical or abiotic factors associated with the flora and fauna.

Viewed from the above definition, the ecology of *khazan* lands of Goa shows a superbly harmonious blend amongst people, animals, land, plants and water. This harmony was established by the *khazan* land developers using their traditional knowledge of climate, tidal cycles, geomorphology, monsoon precipitation, runoff, sediment, dynamics, soil properties and drainage characteristics of estuarine lands.

Estuaries, mangrove forests, mangrove scrubs, outer embankments, inner embankments, backwaters, creeks, sluice-gates and drainage canals form important components of the *khazan* land production system. Water of variable salinity is the dynamic element in this system. Ecological conditions differ before, during and after the monsoon. The volume of water and the sediment load carried by the rivers on one side and the tidal flushing on the other side keeps this system in a delicate balance. Any disturbance in this balance therefore may be amplified and carried forward from one point to the other over a period of time. The biota of estuaries, mangrove swamps and forests, intertidal zones, mud flats, embankments and the productive *khazan* farms constitute very vulnerable elements of this system.

The *khazan* lands of Goa will have to be studied, not as individual units, but as integrated systems specific to each estuarine region, floodplain and river basin which influence their ecology.

Characteristics of *khazan* land protection systems —The reclamation efforts of centuries have contributed to evolution of about 17,000-18,000 ha of *khazan* lands. The most notable features which ensured the success of their reclamation strategy were:

1. Environmentally compatible anti-erosion defence structures, commonly known as 'embankments' or 'bunds', which having been organised as a three-tier defence system, used principles of environmental compatibility, optimal use of local materials and the knowledge gained through 'trial and error' methods spanning generations of local farmers.
2. An effective, reliable and low-cost saline water drainage system for the floodplains which integrated harmoniously with the general topography.
3. Besides embankments and sluice-gates, the *khazan* farmlands are internally interconnected by laterite built cross-drains and cast iron or RCC pipes for smooth circulation and drainage of water.

The ALDP found in its survey that a number of ongoing developmental activities and the rapid socioeconomic changes since liberation have adversely affected these ecologically compatible and harmonious systems i.e. mangrove forests and *khazan* lands. The activities are listed below:

1. Deforestation in upper river basins
2. Uncontrolled urban growth
3. Man-made pollution of estuaries
4. Heavy barge traffic in Mandovi and Zuari rivers
5. Encroachments in wetlands/marshy lands
6. Destruction, blockage or imperfect substitution of natural drainage systems
7. Uncontrolled and illegal pisciculture
8. Unauthorised extraction of mud, shells, etc.
9. Problem of slums, scrap yards and junk yards near estuarine area
10. Other development related activities

The Beginnings of the End—Until the dawn of freedom in 1961, one might have thought this precious legacy and cradle of Goan culture would be protected and preserved. Alas for the *khazans* (as for so much else in Goa's ecology), freedom has meant anarchy. Since liberation, these lands which have withstood the vagaries of history, sea and tide for over 2000 years have been breached and raped unsparingly. And as that wrested from Varuna (the sea god) with centuries of toil is offered up recklessly at the altar of Mammon, few seem to care.

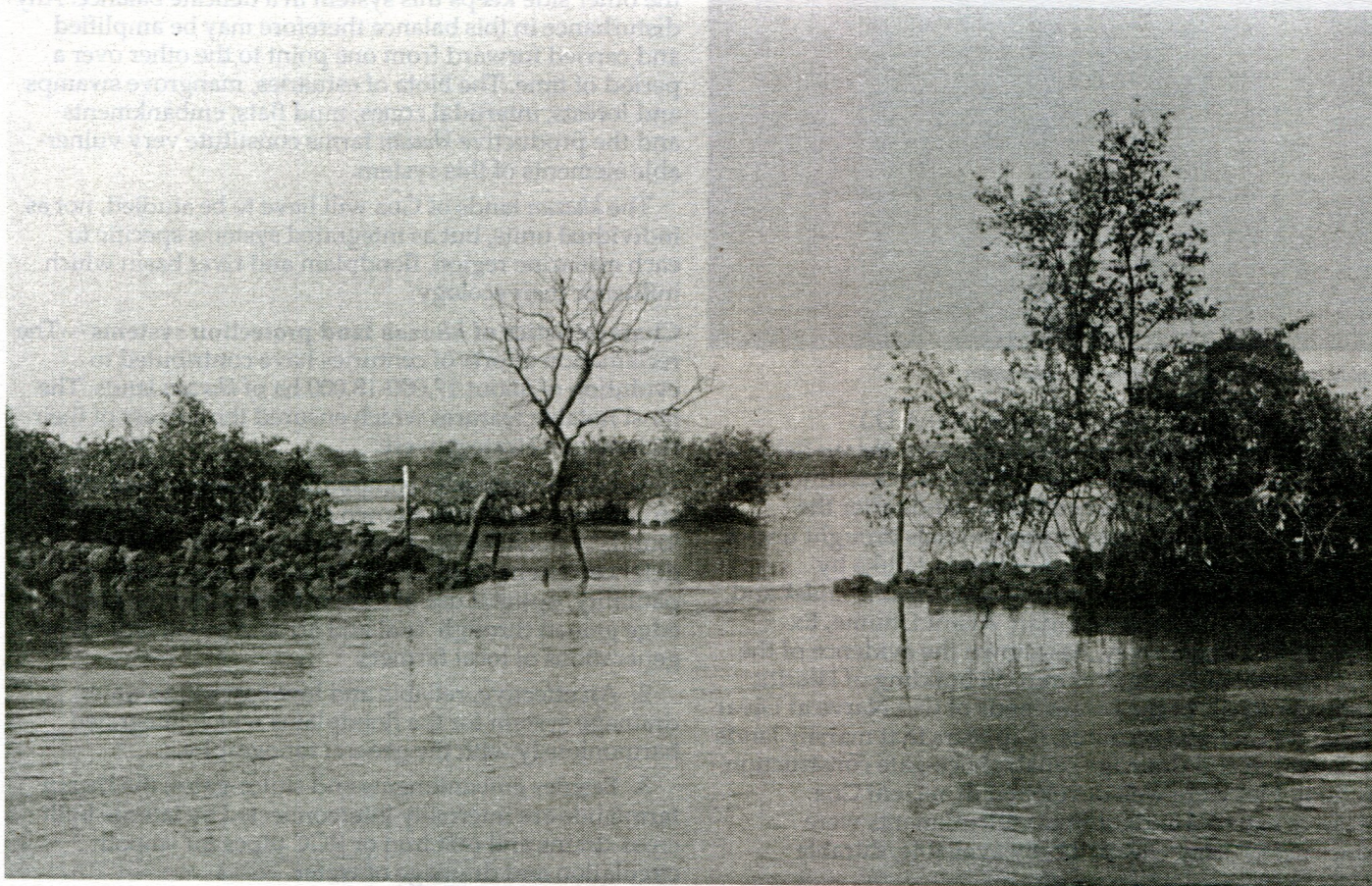
Salt water rushes into *khazan* after embankment has been broken to enable illegal fishing

Lip service has been paid to their preservation by scores of politicians and half a dozen Government Committee reports over the last three decades. But all through, one fact has continued to illuminate the fundamental apathy: nobody has bothered to find out how much *khazan* land there is—or rather—is left.

In 1964, the National Council of Applied Economic Research decided (without disclosed documentation or source) that there were 18,000 hectares. Fifteen years later, in 1979, the authoritative *Gazetteer of Goa* repeated the figure with no attempt at verification or update. Another 13 years later, on March 20, 1992 the ALDP report continued to insist that the figure was 18,000 hectares, again without documentation. The expert panel was outdone just four days later on March 24, 1992 when a 'select committee' of the Legislative Assembly, in its democratically elected wisdom, deigned that the figure was 18,500 hectares—but yet again, without a shred of evidence.

If the static figure on *khazans* bandied around for three decades underscores the fundamental apathy of the powers that be, an interesting counterpoint is a recent piece of legislation which seems to highlight the mindless (or is it 'avaricious, community-destroying'?) eagerness with which they are willing to drown the precious legacy bequeathed by Goa's forefathers.

Pisciculture or aquaculture in the *khazans* has been a sore point in recent years not only among ecologists, but also among the farmers of these lands. Long prevailing laws and conventions were in the farmers' favour. Not



surprisingly therefore, the first attempt to redress the legal balance was made in November 1990 when the Pratapsing Rane Congress-I ministry had been dislodged and a clique of pro-aquaculture power lobbies took control. An attempt was even made to subvert the report of the ALDP to justify the introduction of aquaculture in *khazan* lands.

Germane to the issue is the fact that the ALDP suggested encouragement of aquaculture on a limited scale. And though this was 'in passing' as it were, it apparently was just what the powers that be had waited for.

Only four days after the ALDP submitted its report on March 24, 1992, the Legislative Assembly's select committee turned in its own report and draft legislation on 'brackish water fish farming'. The bill was passed—with astonishing speed—and notified exactly three months later, on June 24, 1992!

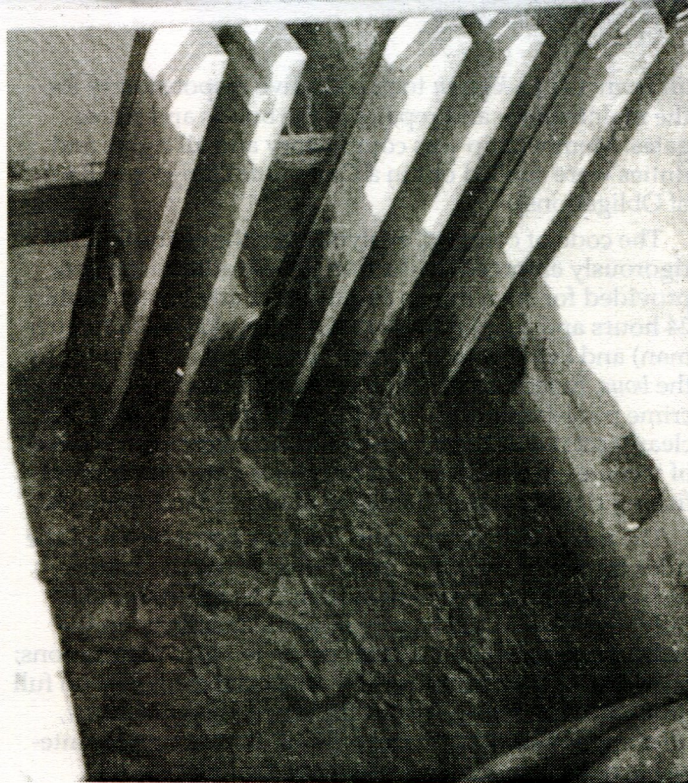
It bears pointing out that whilst the aquaculture act was hustled through by Goa's Legislative Assembly, the ALDP's other more important and urgent recommendations have been studiously ignored. Significantly too, the select committee declared that 3500 hectares—almost 20 percent of the *khazans* by its own estimation—'can be reclaimed for prawn farming.' The committee's recorded reason was that these 3500 hectares 'have become fallow and marshy.' It did not disclose how this conclusion was arrived at or how such a large area was laid waste.

(Note: Even whilst ALDP had admitted its information was unsatisfactory, 18,000 hectares seems a questionable figure. It is equal to only 180 sq km which is less than five per cent of Goa's 3701 sq km area. A look at the map of *khazans* suggests they occupy a much larger part of the state. And the fact that 81 of Goa's 383 villages have *khazan* lands is another indicator.)

The *Khazan* Eaters — If lack of political will, a sense of history and foresight or, more grossly, a destruction-oriented polity are facilitating devastation of the *khazans*, an array of factors and activities are speeding up the process. A sharp rise in the standard of living and poor returns from agriculture in the *khazans* are also often touted as reasons for their abandonment and degradation, but a closer look suggests these arguments are a bit facile. Instead, the real major causes appear to be: wilful and illegal inundation; poor management; uncontrolled and unplanned urbanisation; pollution and siltation; and the construction of the Konkan Railway.

Inundation — Breaching of the bunds is, of course, how the *khazans* are inundated. Breaches began occurring with an increasing frequency from 1950 when the mining industry began in Goa. The larger and larger barges carrying ore down the rivers have been causing bigger and bigger bow waves which have destroyed the bunds, flooding fields, salt pans and coconut groves. Lack of finances has also prevented maintenance and repair of bunds. But the worst culprits by far have been those who, lured by lucre, wilfully and illegally breach the bunds with dynamite to make a fast buck from pisciculture at enormous cost to the *khazan* farmers and society at large.

Breaching bunds and reaping rich fish harvests constitute a 'low capital investment-high yield' method of making money. It is therefore resorted to on an increasingly wide scale. Experience has shown that the people involved in this 'business' are not the *khazan* farmers



Sluice gates in open position

themselves, but lumpen elements in the villages who have no stake in produce of the fields and are often hoodlums and henchmen of local politicians.

Few seem to have realised the massive costs of this anarchic pursuit. Not only are crops lost, but soil salinity in the neighbourhood of inundated *khazans* increases sharply, sweet groundwater sources are polluted, coconut plantations rot and air corrosion is intensified. Then again, the cost of rehabilitating such *khazans* is so high that they are abandoned—quite often resulting in permanent loss of the community's assets.

It is for these reasons that the brackish-water fish farming act referred to earlier must be looked at with circumspection. Legalising inundation and pisciculture was its obvious purpose. But one would have thought it would be only the thin edge of the wedge. That the wedge is 3500 hectares—or 20 per cent—of the *khazan* lands can only be viewed with alarm!

(Mis)Management — Perhaps the greatest damage to the centuries-old legacy has resulted from a post-liberation legislated change in the management system of the *khazans*. As the government's own ALDP put it in 1992, 'Our observations clearly indicate that under the Tenancy Act 1964, the ownership of the land has been given to the erstwhile tenants of the ecologically complex *khazan* lands without going into the practicability of each deemed owner looking after the welfare of his plot of the land through the so called tenants's association.'

The ALDP indictment was unequivocal: 'Our studies showed that the "populist concerns" instead of "productive and practicable concerns of ecologically sustainable development" have been given priority at a phenomenal cost to the socioeconomic and environmental health of the State.' Indeed, there could perhaps be no better example of unplanned redistribution resulting in major losses to the community.

Before liberation, the *khazans* were managed under a *bous* (brotherhood/collective) system. This ensured that

all farmers of a *khazan* took collective responsibility for the maintenance and repairs of the bunds and sluice gates. Membership was compulsory and all rights and duties were spelled out in a *Caderno de Obrigações* (Book of Obligations).

The code of conduct, evolved over the centuries and rigorously enforced by the Portuguese administration, provided for such things as closure of any breach within 24 hours and a *kamat* (supervisor of works), *paini* (watchman) and *kulkarni* (accountant/secretary), all paid for by the *bous*. Retention of saline water for breeding fish was a crime punishable with both fine and imprisonment. As clearly set out as the duties of the *bous* were their sources of income—from auction of the sluice gates (for limited fishing rights), sale of damaged shutters, land rents, etc.

The infantile 'democratic' tenancy act of 1964 and the rules framed thereunder in 1975 destroyed the mature, well evolved management system. The result: ecologically, technically and legally illiterate members on the elected managing committees of the tenant's associations; hijacking of the committees by antisocial elements; no full time employees to carry out the crucial tasks of *kamat*, *paini* and *kulkarni*; haphazard (if not fraudulent) maintenance of accounts; and consequent disillusionment, cynicism and distrust among members.

As if this were not enough, the government which appropriated the right to supervise and control the associations has failed to do what is needed: discipline them by checking accounts, etc.; punish illegal aquaculturists; take over uncultivated *khazans* (which it is empowered to); and set aside enough money to repair breached bunds (which it obliged itself to under the 1964 Act). No wonder then that management of the precious *khazans* has been left to the winds, tides, lumpen and antisocial elements!

Urbanisation — An unprecedentedly rapid rate of urbanisation is contributing in large measure to the pressure

on *khazan* lands all over Goa. More so, since successive governments have consistently failed to evolve a clear policy and rationalise urban development in the State.

The 1991 census figures reveal that the urban population increased by a massive 48.63 per cent during the previous decade. Between 1991 and 2001, though the overall population growth rate was around 15 per cent; the urban growth rate is estimated to have been over 30 per cent. Given the lack of a policy, the towns have burgeoned, spilling onto surrounding *khazan* lands. The demand for urban accommodation has sparked a construction boom which has in turn sent land prices soaring. The temptation to sell relatively low yielding agricultural lands to developers/builders has therefore become very strong—even as the phenomenon and lack of policy have made land conversion the most lucrative racket for politicians in the State.

Khazans surrounding the old city of Panjim have disappeared under concrete all the way to Miramar, Taleigao and Caranzalem to the west and southwest and the trans-creek salt pans to the east. Mapusa keeps spreading into the fertile fields to its south even though there are barren and semi-barren hilltops to the west and northwest on which it could develop. In south Goa too, growing Margao devours *khazan* lands when expansion in the hilly easterly direction would cause far less ecological damage.

The tourism boom is quickly becoming the bane of *khazans* and wetlands in the hinterland of the beaches. Those in the Calangute-Candolim stretch in north Goa are already under considerable 'developmental' pressure. And it cannot be long before this happens in south Goa too.

Konkan Railway Through Khazans — Speedier by centuries than Parashuram's arrow in creating the *khazans* seems to be the Konkan Railway in destroying them. Never in Goa's history have the *khazans* been subjected to

Sluice gate operator repairs gates



an assault of such magnitude, all at once.

The controversial railway alignment runs for no less than 30 km through the heart of the *khazans* from Asnora-Mayem in the north to Cortalim in the south before cutting through more *khazans* near Margao and south of Chaudi (Canacona). The railway engineers are blasé about this, but the consequences of an embankment of that length, often 40 feet high and 150 feet wide, running through the *khazans* can well be imagined.

The ALDP itself has observed that 'any new bund-like structure with a broad platform for construction of a road or railway track will cause division and loss of the drainage pattern of huge *khazan* lands.' The embankment will quite certainly obstruct the regular tidal flushing and kill the fragile ecosystem of the *khazans*. It is estimated that at least 60 sq km will be affected thus.

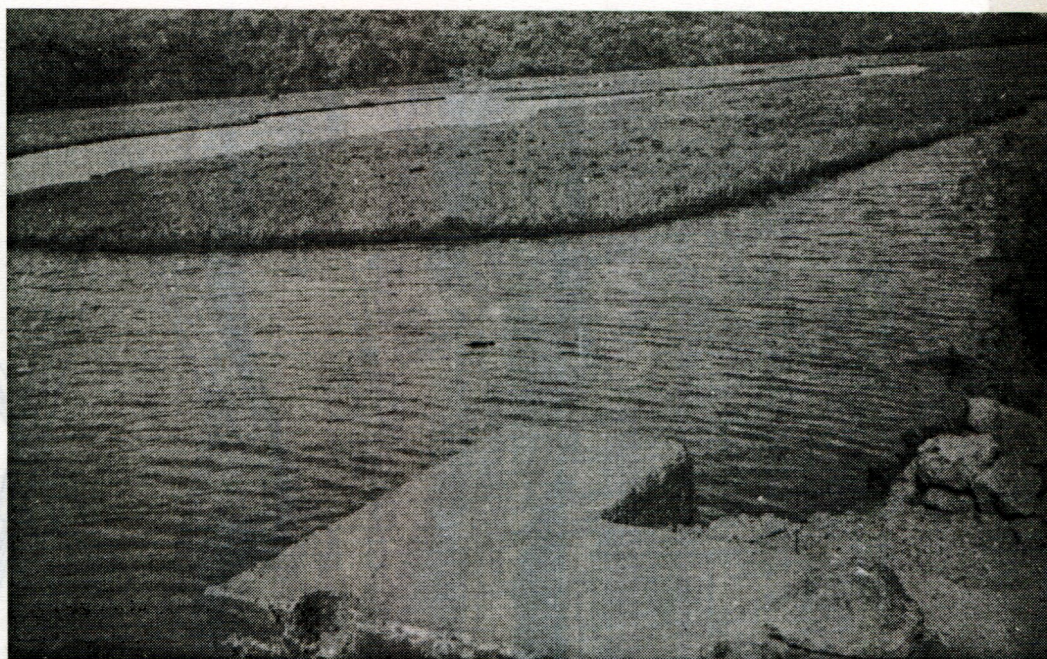
Pollution — Bilge washings from ships in Mormugao harbour as also from barges and trawlers using the rivers are an important polluting factor. The oil, grease, tar balls, etc. are washed into the *khazans* seriously affecting their fertility, damaging the marine ecosystem. The effects are most noticeable in the *khazans* at Siridao-Batim-Agassaim upstream from the Mormugao harbour and at Ilha de Rachol where a large number of trawlers are anchored during the monsoons.

The huge load of sewage and domestic garbage dumped in the rivers and creeks also affects the biota of the *khazans* even whilst non-biodegradable waste such as plastic bags and bottles, cans, etc. choke estuarine and *khazan* fauna.

Deforestation in the upper reaches of the rivers and runoffs from the several ore and ore reject dumps on the river banks result in heavy sedimentation increasing the estuarine flood plains and threatening the defensive bunds around the *khazans*.

Saving the *khazans* — Some of the onslaughts on the *khazans*, like the Konkan Railway, have caused irreparable damage, but at least some mitigation could be done by improving the drainage system which has been blocked by the railway. But the solutions can succeed only if there is sufficient political will, a sense of history and a firm commitment to a sustainable future. It would, in fact, seem no exaggeration to declare that the precious *khazans* will be lost forever if the present kind of political leadership continues to guide the State's destiny.

The ALDP has recommended that an 'Integrated Estuarine and *Khazan* Area Development Plan' is essential to any attempt at saving, rehabilitating and developing the *khazans*. It has also suggested that an 'Agency for Planning and Management of Estuarine and *Khazan* Areas' (APMEKA) be constituted to evolve the plan and oversee its implementation professionally. It has further been suggested that relevant parts of the 1964 Tenancy



The creeks (poim) of a *khazan*. The poims are designed to accommodate river water at high tide.

Act be scrapped and replaced with new legislation incorporating the positive features of Goa's pre-liberation *bous* system (outlined earlier) and progressive laws from Maharashtra. The new Act should involve entrusting the overall management of the *khazan* lands to the proposed APMEKA and transferring the responsibility of bund maintenance and repair to the village panchayats from the existing tenant associations.

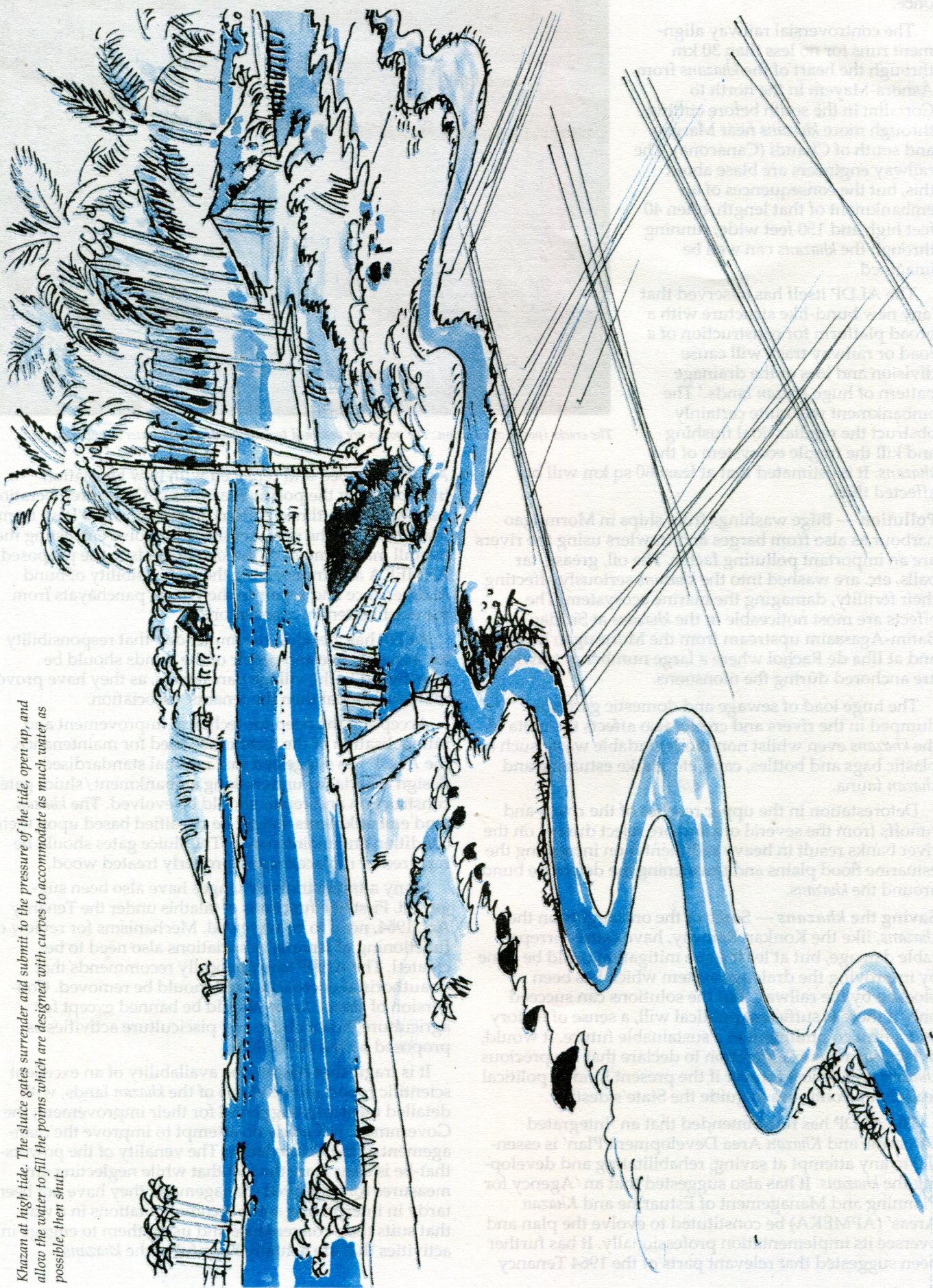
ALDP has, besides, recommended that responsibility for maintenance and repair of the bunds should be transferred to the village panchayats, as they have proved more functional than the tenants' association.

Accepting the need for technical improvement and rationalisation of the techniques used for maintenance, the ALDP has suggested that rational standardised design criteria for undertaking embankment/slucice gate construction and repair should be evolved. The *khazan* land embankments should be classified based upon their condition and maintenance. The sluice gates should be repaired or replaced using properly treated wood.

Many administrative changes have also been suggested. First, the functions of talathis under the Tenancy Act, 1964, need to be reviewed. Mechanisms for review of functioning of tenants' associations also need to be created. The ALDP unequivocally recommends that unauthorised encroachments should be removed. Conversion of *khazan* lands should be banned except for agriculture, horticulture and pisciculture activities as proposed by the APMEKA.

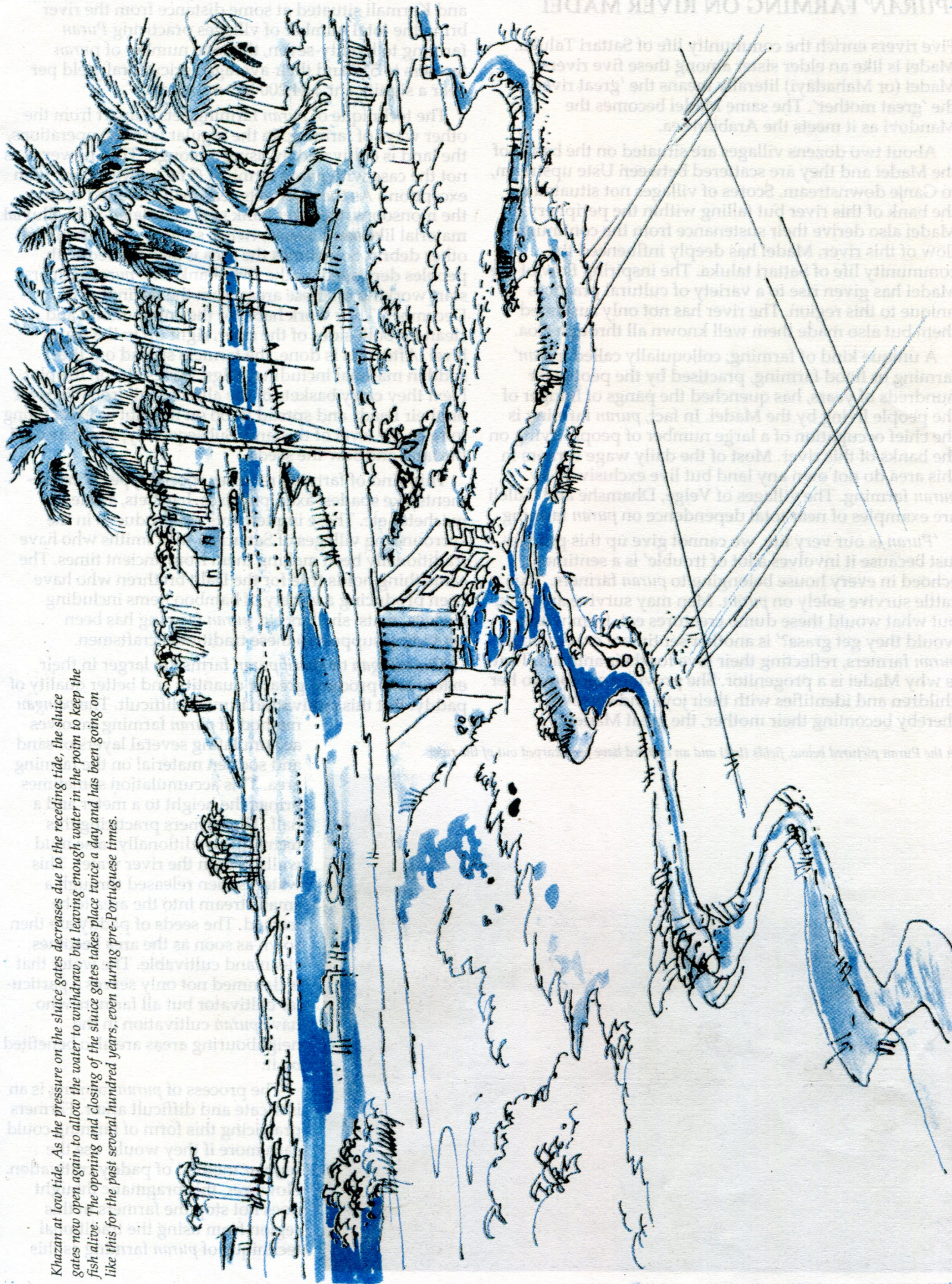
It is tragic that despite the availability of an excellent scientific report on the status of the *khazan* lands, with detailed measures suggested for their improvement, the Government has made no attempt to improve the management of the *khazan* lands. The venality of the powers-that-be is clear from the fact that while neglecting any measures for improved management, they have not been tardy in interpreting some recommendations in a way that suits their convenience and using them to engage in activities that are actually harmful to the *khazans*.

KHAZAN AT HIGH TIDE



Khazan at high tide. The sluice gates surrender and submit to the pressure of the tide, open up, and allow the water to fill the poims which are designed with curves to accommodate as much water as possible, then shut.

KHAZAN AT LOW TIDE



Khazan at low tide. As the pressure on the sluice gates decreases due to the receding tide, the sluice gates now open again to allow the water to withdraw, but leaving enough water in the pool to keep the fish alive. The opening and closing of the sluice gates takes place twice a day and has been going on like this for the past several hundred years, even during pre-Portuguese times.

'PURAN' FARMING ON RIVER MADEI

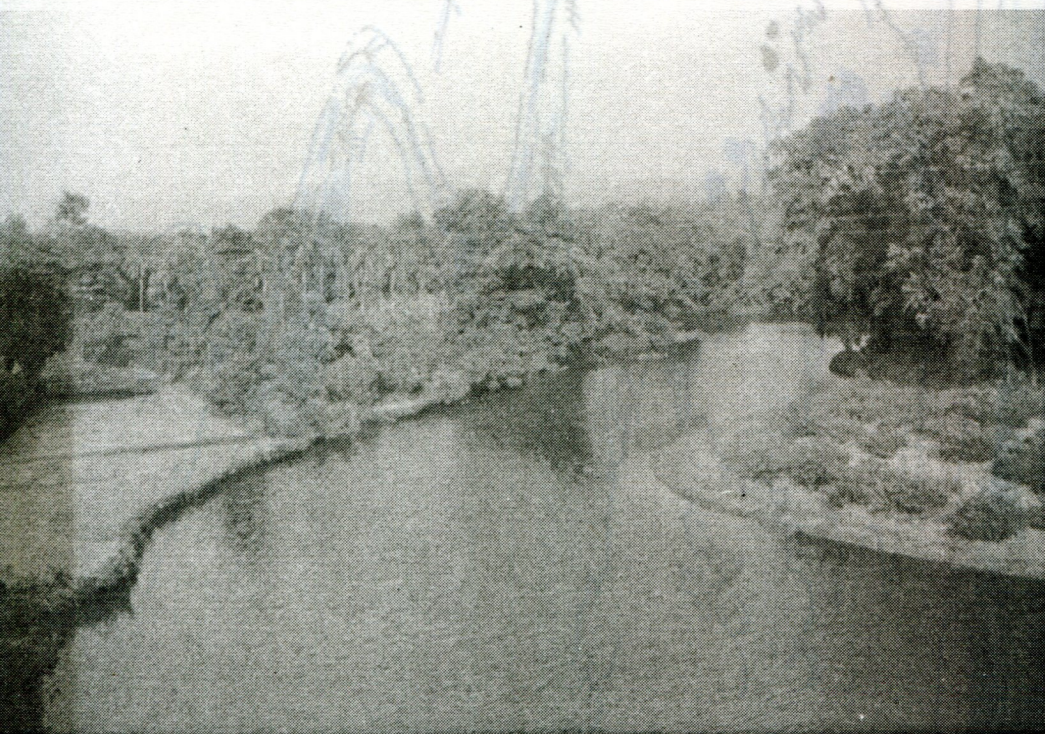
Five rivers enrich the community life of Sattari Taluka. Madei is like an elder sister among these five rivers. Madei (or Mahadayi) literally means the 'great river' or the 'great mother'. The same Madei becomes the Mandovi as it meets the Arabian sea.

About two dozens villages are situated on the banks of the Madei and they are scattered between Uste upstream, to Ganje downstream. Scores of villages not situated on the bank of this river but falling within the periphery of Madei also derive their sustenance from the continuous flow of this river. Madei has deeply influenced the community life of Sattari taluka. The inspiring flow of the Madei has given rise to a variety of cultural practices unique to this region. The river has not only sustained them but also made them well known all through Goa.

A unique kind of farming, colloquially called '*puran*' farming or flood farming, practised by the people for hundreds of years, has quenched the pangs of hunger of the people living by the Madei. In fact, *puran* farming is the chief occupation of a large number of people living on the banks of this river. Most of the daily wage earners in this area do not own any land but live exclusively by *puran* farming. The villages of Velge, Dhamshé and Guleli are examples of near total dependence on *puran* farming.

'*Puran* is our very life, we cannot give up this practice just because it involves a lot of trouble' is a sentiment echoed in every house belonging to *puran* farmers. 'Our cattle survive solely on *puran*. Men may survive anyhow, but what would these dumb creatures eat, from where would they get grass?' is another sentiment expressed by *puran* farmers, reflecting their love for their animals. That is why Madei is a progenitor. She provides succour to her children and identifies with their joys and sorrows, thereby becoming their mother, the great Madei.

In the Puran pictured below, fields (left) and an orchard have been carved out of the river



The twenty-four villages from Uste upstream to Ganje downstream and three more villages of Dhavé, Karanjol and Karmali situated at some distance from the river bring the total number of villages practicing *Puran* farming to twenty-seven, the total number of *puran* farmers to 517 and their average agricultural yield per year a significant 3,64,200 kgs of paddy.

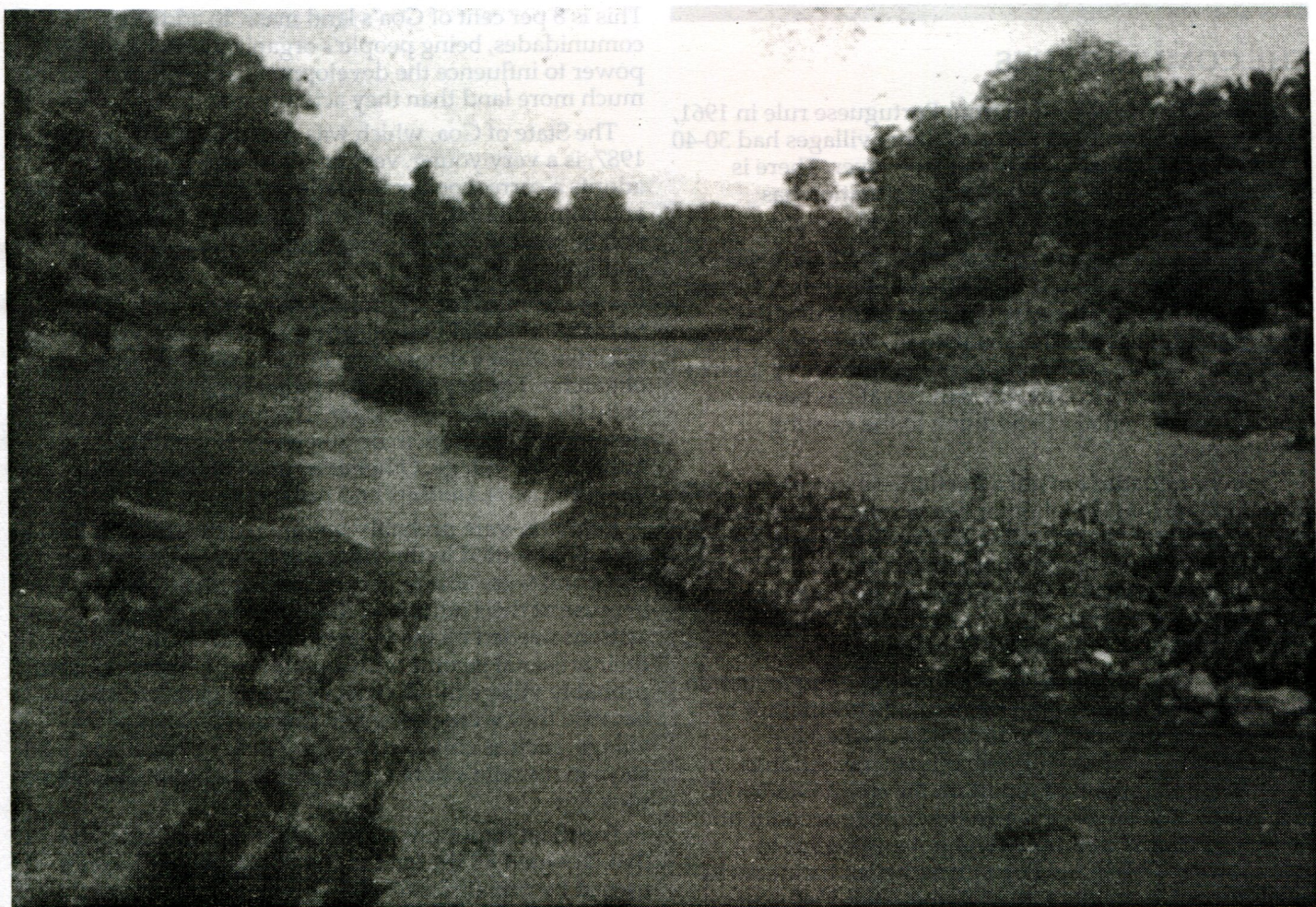
The technique of *puran* farming sets it apart from the other ways of farming. In the regular farming operations, the land is cultivated by using a plough. This, however, is not the case with *puran* farming. (The *vaingan puran* is an exception.) As the river gets seasonally flooded during the monsoons, the river bank gets inundated with alluvial material like sand, waste, twigs, sodden vegetation and other debris. Sometimes the area is also littered with pebbles deposited on the river bank. The *puran* farmers start working on these areas from the beginning of December. They work hard for the entire month and clean up both sides of the river, right up to the water level. After this is done, the farmers spread out the sodden material including twigs, leaves etc. on the plot. Next they carry baskets of the alluvial soil from the river on their heads and spread it too on the plot as extra filling to raise the level of the land. Subsequently, they fence off the land and sow the seeds.

This kind of farming requires special types of implements like spades, axes, pickaxes, hatchets, sickles, machetes etc. These implements are produced in the surrounding villages of Sattari by iron smiths who have traditionally been making them from ancient times. The same thing holds true for the Dalit brethren who have been producing a variety of bamboo items including baskets, mats, shelters etc. *puran* farming has been providing support to these traditional craftsmen.

The *vaingan* or *kharif puran* farms are larger in their extent and produce greater quantity and better quality of paddy. But this cultivation is more difficult. The *vaingan*

method of *puran* farming involves accumulating several layers of sand and sodden material on the farming area. This accumulation sometimes brings the height to a meter and a half. The farmers practicing this technique traditionally raise mud walls to dam the river water. This water is then released through a small stream into the area to be farmed. The seeds of paddy are then sown as soon as the area becomes clean and cultivable. The water that is dammed not only serves a particular cultivator but all farmers who have *puran* cultivation in the neighbouring areas are also benefited by it.

The process of *puran* farming is an intricate and difficult affair. Farmers practicing this form of farming could earn more if they would use the regular method of paddy cultivation. However, this pragmatic thought does not stop the farmers in this region from using the traditional technique of *puran* farming as this



Puran sheti involves creation of temporary rice fields in river beds with the use of local materials

has been handed over to them over many generations. The technique of *puran* farming is truly inseparable from this type of farmer.

The farmers work jointly to dam the water and do not use modern techniques of dam construction but rely upon the traditional methods used by their forefathers. The method of driving wooden poles into the soil, surrounding them with branches of trees, stacking the boulders from the river bed etc. are unique and distinct from modern methods of damming. All these traditional practices will however wither away if the state of Karnataka is allowed to build its proposed dam on the Madei. The construction of this modern dam will diminish the flow of this river bringing about starvation of the *puran* farmers. This will undoubtedly result in the complete destruction of traditional and time-tested farming practices of this region.

The destruction of *puran* farming will also mean the decline of the community spirit among people. There are many instances of joint *puran* farming where two families come together, cultivate the land and share the end produce of their joint efforts equally. Cooperation on the field also leads to shared rituals, many of them linked with the river.

There are number of '*kondi*' (local name for a water body or depressions) found in the river bed of the Madei. *puran* farmers and other folk in this region believe that some of these depressions are a favourite dwelling place

for the local guardian spirit or '*devchar*'. Hence the *puran* farmer begins his work only after he pays obeisance to the local gods. If these depressions are wiped out due to the activity of dam construction tomorrow, it will strike at the very foundation of folk beliefs and rituals.

The destruction of *puran* farming would also mean starvation for the animals. About 85% to 90% of these farmers tend cattle. These cattle are raised on the grass freely grown as a by-product of their cultivation. This ensures milk supply. The farmers sell this milk to the cooperatives and make an extra profit.

The proposed dam by the state of Karnataka on Madei threatens the very survival of *puran* farmers and the common people of Goa. Under these ominous threats, Goans should not lie gentle the way the Madei flows during summer. Instead, the people of Goa should assume the fierce look of the Madei when it brings about its seasonal floods during the monsoons.

Prakash Paryenkar
(Translated from the Konkani by Vishram Gupte)

THE COMUNIDADES

At the onset of its liberation from Portuguese rule in 1961, Goa was lushly forested and even large villages had 30-40 per cent of their land mass under tree cover. There is evidence that in the last 30 years this situation has changed rapidly for the worse for several reasons.

Under the Portuguese regime, the key village organization was the *comunidade*, while under the Indian system it is the *panchayat*. These two distinct forms of village administration have had a qualitatively different impact on the way village communities either nurture or destroy their environment. In Goa, the *panchayat* has been created in every village in addition to the existing *comunidade*.

The *comunidades* are not a Portuguese invention. They are an unique manifestation of democratic village self-government that has prevailed all over India in different forms since ancient times. They existed before the Portuguese and are probably the creation of the Saraswat Brahmins, who migrated to Goa before the White Hun invasions of north India in the 5th century AD.

As they were principally a Hindu form of organization the Portuguese in the initial stages made no attempt to dismantle them, as they did to Muslim ownership systems. In 1526 the Portuguese bureaucrat, Alfonso Mexia, compiled the first report on the *comunidades* of Goa, which was no more than a descriptive account of their customs and traditions, and not an attempt to regulate them. When the Portuguese began their attacks on Hindu practices like *sati*, and later from 1540, their destruction of Hindu temples, they made some attempts to dismantle the *comunidades*, then thought better of it and left them alone.

It was only in 1880, under a Parliamentary form of government in Lisbon, that all the Portuguese laws affecting *comunidades* were compiled into a Code. The Code in effect tried to change the way the *comunidades* worked, by trying to 'monetise' them, to make the collection of land revenues easier. This Code, with various revisions, prevailed till Liberation in 1961.

In the post-Liberation period, very definite attempts were again made to dismantle the *comunidades* and undermine their operations. In 1962, the (Indian) Military Governor passed three orders which effectively stopped the flow of income to the *comunidades*. Since then attempts are under way to seize their assets and control their managements. Today the *comunidades* have been reduced to a shadow of their former selves. From a social preeminence in rural Goa, they have faded into nonentities.

The damage to the organizational strength of the *comunidades* is reflected in the damage to the environment of rural Goa. Many hills have been deforested, many springs and fountains have dried up, mining of ores and quarrying of rocks have laid bare the soil, and haphazard settlements populate the hills. Most of the damage has taken place on *comunidade* lands. So there is an obvious connection.

However, although the *comunidades* have been severely damaged, they are not dead as yet. Even today, 232 village *comunidades* own 30,000 hectares of land.

This is 8 per cent of Goa's land mass. In addition, *comunidades*, being people's organizations, have the power to influence the development and utilization of much more land than they actually own.

The State of Goa, which was constituted only in May 1987, is a very young, very small state of India. If it adopts a correct policy towards environmental protection and *comunidades*, there is the possibility that a model will be created, which other states of India can learn from and imitate.

Comparison of the Comunidade System with other Systems of Rural Organisation — The *comunidade* is a selective village democracy, in some ways closer to an oligarchy. The key category of membership was originally the '*gaonkar*' or villager. The *gaonkar* is a male descendant, through male descendants, of a founding father of the village. Other categories of membership were: *kulcharis*, *kuntkars* and pensioners.

Kulcharis were probably servants of the rulers of the area, who settled in the village as educators or bureaucrats, and were able to become *comunidade* members because of their influence. *Kuntkars* were probably artisans needed by the village, who had to supplement their artisanal income with agriculture. Pensioners were probably village inhabitants, who lost '*gaonkar*' status, because they were descended through females of the village, such as children of a '*ghar-jamai*' or husband who stays in his wife's house, because his father-in-law has no sons.

The most important feature of the *comunidade* was that it owned all the land in the village which was not owned by private families.

The *comunidade* was therefore the residuary land-owner of the village. The nature of the residuary land-ownership in rural areas is of the utmost importance to the nature of the entire society of a country.

The British, after the conquest of India, refused to recognise the residuary land mass ownership rights of collective bodies. All lands, they claimed, were all now vested in the Crown.

As successor to the British possessions, the Government of India essentially carried further the British policy with respect to residuary land mass ownership rights. Most village *panchayats* (unlike *comunidades*) are not titular owners of all those lands in the village which do not belong to the private owners.

Compared to the British-Indian system, the *comunidade* seems indeed to be an extraordinarily democratic system. It is certainly deserving of closer attention by a Government ostensibly keen on trying to extend the democratic legacy to hundreds of thousands of villages, which even now have politics that can only be termed as feudal.

It is only on a bedrock of village democracy that larger urban bodies like *nagar panchayats* and municipalities can become functional civic systems. Hundreds of small and medium towns all over India are unplanned and filthy, only because their democratic bodies cannot function politically, so that they are permanently under the administration of Government appointed officials.

While the *comunidade* is an element of Goan culture which is as worthy of export to the Indian mainland as the more famous aspects such as cuisine or scenery, it

must be said that there is need to review the rules of its membership. Existing comunidades exclude women and they exclude people who have lived in the village for a generation or more. There are also caste biases and religious biases. Their homogeneity may have been the critical reason for their longevity and effectiveness in the past, so tampering with their practices should be done very cautiously.

The success of the Comunidade System: Economic Rights, Rewards and Participation — The comunidade administered its lands by auctioning the cultivation rights of its paddy fields, or the harvesting rights of its plantations of coconuts, cashews or mangoes for three year periods. These auctions provided 80 to 90 per cent of the income of the comunidade.

This income was used to pay the land tax to the government, (19-20 per cent of income), provide community services (16 per cent of income), maintain religious places (6 per cent of income), administer the comunidade properties (22-25 per cent of income). The remaining money was used to repay loans, build financial reserves and declare dividends to shareholders or *gaonkars*.

This dividend or *zonn* (in Konkani), or *jono* (in Portuguese), was a key feature of the comunidade system. A comunidade member obtained this dividend every year: it was a visible, monetary link with a properly functioning collective. Originally this dividend went only to '*gaonkars*', who were all the inheriting male villagers above the age of 12 years. They were called *zonners* (in Konkani) or *joneiros* (in Portuguese).

In the reforms of 1882, the Portuguese formed some comunidades mainly in Salcete and Bardez into shareholding companies. Various categories of villagers had been given usufruct rights over various produce of the comunidade lands. These rights were converted into shares, each of Rs 20 nominal value, probably so that the rights could be auctioned every year, and thus yield a taxable revenue to the government. These shareholders could sell or transfer their shares, but they had no hereditary rights.

The system of auction and dividend maintained an equilibrium between those comunidade members who gained cultivation and harvesting rights in the auctions, and the remaining members, who obtained community services or dividends.

Another key participant in the system was the government, which wanted to ensure that it received its due share of revenue. In 1904, it intervened to establish parity between *gaonkars*, *kulcharis* and *kuntkars* while bidding for cultivation or harvesting rights to comunidade properties.

From 1920, Goa gained the right to send 6 representatives to the Portuguese parliament. In 1926 however, the dictatorial Salazar regime took office, and it introduced the Colonies Act in 1930 by which Goa was dispossessed of this right. In 1933, the Portuguese Government published the first regulatory Code of Comunidades, which among other things, introduced the requirement of a financial guarantee to be provided by successful auction bidders for payment of the rents. The requirement of capital that this generated, prevented poor professional cultivators from gaining access to the comunidade fields directly, and gave rise to subletting. So in 1938, the guarantee condition was waived and subtenancy prohibited.

This aspect of the comunidade operation deserves notice. In practically no rural community across the world can private landowners provide sustained employment to all labourers. Agricultural operations are fraught with so many uncertainties that in every village a pool of labourers arises which is available to those who have had better fortune in a particular year. It has always been a function of the residuary village land owner to provide these labourers with employment in those years when all the private farmers or landowners do not have enough yields to provide work to all labourers.

In Goa, the comunidade as a long term residuary landowner, was always in competition with private landowners for rural labour, for agricultural purposes. Thus the institution provided landless rural labourers with an opportunity of an alternative career in agriculture, as against being lifelong servants of private landowners. A proficient agriculturist with enough labour in his immediate family, might bid for cultivation rights of a comunidade field and might even accumulate enough capital to buy some land of his own.

Because comunidades owned about 40 per cent of the land mass, they were sufficiently large to be important interveners in the rural labour market. If private farmers wanted to retain their labour they had to treat them well. There is evidence that this resulted in favourable ratios between the landlord's and the tenant's share of the harvest. In Goa before 1961, tenants used to retain 75 to 80 per cent of the harvest yield. Today in Gujarat, when the Government is the residuary landowner, the tenant gets between 25 to 33 per cent of the harvest yield.

As the residuary landowner, the comunidade spent almost 20 to 25 per cent of its annual income on property development works. It lined paddy fields with laterite blocks to enable flooding, it lined watercourses, it installed sluice-gates and allocated harvested water; it planted orchards of long maturing trees like coconuts, mangoes and cashews. These works did not only benefit the comunidade, they helped private property as well. Comunidade experiments with new agricultural species provided the research and development experience which eventually benefited all private landowners. For example, when the Portuguese found cashew trees in Brazil, the comunidades planted them on the Goan hillsides. In Saligao village, the comunidade helped the introduction of sugarcane cultivation which made the village rich. Many comunidades had their own animal doctors and agricultural extension workers to provide services to the village.

The financial strength of the comunidades proved the soundness of the comunidade system. In 1954, all the comunidades together held 36,624 hectares of land, of which 14,968 hectares were paddy fields, 5,506 hectares were under cashew and 431 hectares under various plantation crops. Their total income was Rs 63 lakhs. (Today's currency equivalent of that would be approximately Rs 7.6 crores.) They grew about 47,000 tonnes of paddy at a yield of more than 3 tonnes per hectare. They distributed dividends to 52,000 *zonners* of whom 50 per cent lived in the villages from which they drew dividends. The *zonners* comprised 16 per cent of the total Goan population, which meant that a very large portion of all Goan families were covered (since women and children were not *zonners*).

To provide some indication of what this meant to rural Goa: at today's prices an average comunidade received an income of Rs 3 lakhs for a village of 1,000 people. By comparison, in even the richest states of India today, the village panchayat of a hamlet of 1,000 people will not have an income of more than Rs 10,000 in a year.

More than the money they earned, the comunidades maintained the natural environmental resources of their villages in a pristine condition, which is one of the reasons why Goa has become so attractive to foreign and mainland tourists today. They did this not only because it was their heritage, but also because it materially profited them to keep things that way. Today, in the villages of India there is no administrative equivalent of the comunidade system, and they are much the poorer for it. Money doled out from Delhi or the state capitals can never stimulate people in villages to preserve their environments the way money they generate themselves from their own natural resources can.

Deficiencies in the System of Rural Administration —

When the designers of new India's system of rural administration began their work, they seemed to be reacting to the evils of *jamindari*. They thus attempted to abolish *jamindari*, they abolished forced labour, they attacked private money-lending, they tried to make tenants the owners of the lands they cultivated, and they tried to limit land ownership.

On the positive side, very little was done. Acharya Vinoba Bhave's *gram-daan* movements, which essentially tried to create a comunidade situation, evoked very little response from the political leadership.

The result is that even today the system of administration of the residuary land mass at village level is in a highly unsatisfactory state. This is one primary reason for the large-scale degradation of public lands. Wherever the Government is the residuary landowner, the local people do not consider the land their own, and allow it to be exploited in every possible way.

This is especially true of forest lands, where rural communities, because they were so richly provided with the gifts of nature, saw no need to own land privately. After 1947, this same land, now owned by the Forest Department, was both illegally and legally clear-felled because communities had absolutely no incentive to protect the forests over which they had no custodial rights.

By leaving the residuary landmass in most villages in the clear ownership of the comunidades, the Portuguese created a completely different kind of organizational model for rural administration compared to the British. While the comunidade of Goa and the panchayat of modern India are both expressions of an ancient indigenous tradition of local self-government, the Indian panchayat bears evidence of its contact with the British colonial administration, just as the comunidade bears evidence of Portuguese administration.

It is now being increasingly recognised that the panchayat is an unsatisfactory formulation. Efforts to reorganize the panchayat system upto the district level as an independent tier of government under the Constitution are a sign of this dissatisfaction.

The problems can be summarized as follows:

a. land revenue is no more a significant component of government income, as it used to be in colonial times;

b. the panchayat system, integrated from village to block or tehsil till the district, is only a spending organization for State and Central government grants;

c. taken together, (although they are organizationally separate), the district revenue organization under the Collector and the development organization under the District Panchayat, are not financially solvent in most cases. They need annual grants from the State and Central exchequers;

d. at village level, the panchayats have incomes in the range of Rs 5,000-10,000 per annum, while their operational and development costs are several times higher;

e. for at least 50 per cent of the landless rural labour in very many villages, there is not enough public rural employment. In a typical village of 300 households, against a need for 30,000 man-days of public labour per annum, the Government finds it hard to provide even 5,000 man-days of labour;

f. most of the Government sponsored rural employment projects generate very few physically productive assets.

It is well known that the Konkan region of Maharashtra is very similar to Goa. But the clear-felling of forests in the Konkan to produce charcoal has raised an ecological crisis of the first magnitude for the Western Ghats.

In an attempt to stave off ecological devastation, the Government is now examining various systems of incentives and rewards to people who use their labour to grow trees on degraded Government lands. For instance, there was a move to provide usufruct rights over produce from trees planted on government lands. However, in some places large chunks of barren land have been provided to landless labourers on an individual basis under a 'tree patta' scheme, and they have not had the physical and financial resources to re-green them.

Designing a People-oriented System for Affirmative Ecological Action — While the Goan people may be far more environmentally conscious than other people in India, there is still the problem that the average Goan is not basically involved with the way the State is being administered on his/her behalf.

Partly this indifference derives from the dictatorial Salazar regime under the Portuguese, which by the Colonies Act of 1930, deprived Goa of its right to send representatives to the Portuguese parliament, which it enjoyed since 1820.

Another cause has also been the blind imposition of English-origin institutions by the Indian Government on Goan society. Post-Liberation Indian policy began with an amalgam of mixed sentiments and policies. For instance, Congress mainland policies of displacing landowners and giving their lands to tenants were implemented quite rigorously, and perhaps thoughtlessly, to create a new client class that depended on the patronage of the Indian bureaucracy to maintain rights and privileges expropriated from others.

The comunidade structure was subverted. First the income of the comunidades was diminished by suspend-

ing auctions, reducing rents and fixing the prices of agricultural commodities. Then the Code of Comunidades was amended to give government servants the right to get land from the comunidades at subsidised prices, without going through the auction procedure. Now the Government nominates the President and Treasurer of the comunidades, and these officials in turn give away the land of the comunidade to Government on terms highly disadvantageous to the members.

The industrialization of Goa by mainland entrepreneurs was encouraged. To do this a feeling was promoted that the Portuguese had neglected Goan development. This became the justification for transferring the benefits of 'superior' Indian development techniques to a 'backward' Goa.

The lack of involvement of ordinary people with the administration of the state should not be taken to imply that Goan citizens are apolitical or apathetic to political or bread-and-butter issues. In fact there have been several major popular reactions to government policies:

a. the movement opposing merger with Maharashtra was successful in that a plebiscite in January 1967, despite rigging to the contrary, rejected merger with 54 per cent of votes polled, and established the separate identity of Goa for the future;

b. a movement to introduce Konkani as the official language of the state partially succeeded in its objectives;

c. the first struggle against indiscriminate industrialization was the fishermen's struggle against mechanised trawling in the coastal waters; this ended in restrictions on fishing areas and mechanised vessels;

d. now agitations and protests against various government inspired development initiatives such as five-star hotels and indiscriminate tourism, sanction of chemical and petrochemical units, over-promotion of mining, and diversion of forest lands are under way.

One of the end results of these challenges to the political initiatives of the Government is that there is a danger that any kind of cooperation with the government may be viewed as being anti-people. Factionalism may so enter the bloodstream of the body politic that there will be a total breakdown of political processes, with a concurrent disregard for administrative authority.

One of the other problems in Goa has been that a long history of very low net population growth rates has been disrupted. Between 1950 and 1961 the population of Goa increased from 4.05 lakh persons to 5.90 lakh persons, which meant an annual growth rate of barely 0.34 per cent per annum. From 1961 to 1971 the annual growth rate jumped to 3.37 per cent per annum. The future census figures are likely to show that the indigenous population of Goa has been reduced to a minority by immigrants.

As long as the Government of India has the power and ability to provide coherent administration to a factionalised state policy, there is not too much danger in this situation. But instability in Delhi might lead to a more fragile type of situation in Goa, if people do not learn to honour the politics of consensus, which is an important aspect of a functioning democracy.

It is within this context that it will be of value to prepare the grounds for a non-governmental, people-oriented system of affirmative ecological action. Affirma-

tive ecological action requires the politics of consensus rather than the adversarial politics of electoral majorities.

Consensus politics cannot be played by electorally oriented political parties. It cannot be promoted by governments, nor can it be legislated. It is part of the unwritten constitution of a polity. Wherever consensus politics has broken down, as in Nigeria, Sri Lanka or the Punjab or Assam, there is civil war. Because Gandhiji recognised this, as also Vinoba Bhave and Jai Prakash Narayan, they chose to work outside the political government system, even though they had the option.

It will be in the long term interest of the Goan State and the Goan people (as also the Indian State and the Indian peoples), to develop the sphere of consensus politics, using the issues of affirmative environmental action as a methodology. When the State Forest Department, for example, takes a comunidade's lands on long lease, and without a due process of consultation with the community, plants a large number of trees of a single exotic species, they are violating the politics of consensus by arbitrary action.

Consensus politics is essentially the politics of high moral leadership, which is equally capable of generating internal as well as external reform. If the comunidades are populated by conservative elements who have no consideration for the physical well-being of low-income villagers or have no respect for their right to social equality, they cannot be proposed as a vehicle for affirmative ecological action programmes till there is internal reform.

Therefore it is necessary that there emerge a non-governmental leadership that will provide inputs to both the governmental system and the village comunidades, as an intermediary body, until the comunidades are able to throw up a state level leadership of their own, which can legitimately speak for all comunidades as their collective representatives.

The areas of non-governmental action should be:

a. lobbying for a policy which will strengthen the organizational capability of comunidades, to undertake village projects for reforestation, with governmental support and funds;

b. identification of gaps in the capabilities of comunidades and their personnel, and designing and implementing training programmes to boost capabilities;

c. providing technically appropriate planning inputs into comunidade plans and projects for ecological development;

d. implementing a network of essential inputs and services for a Comunidade Ecological Development Programme, such as seeds, saplings, mechanical equipment and tools and services such as soil testing;

e. providing motivational and mutual learning inputs to comunidades and village communities to help them gain the will to design and implement their own village schemes for ecological development;

f. providing arbitration and negotiation services in comunidades and communities where internal disputes and divisions prevent comunidades and communities from acting together.

Jagdish Nazareth

PLANTATION ECONOMY

Traditionally in Goa, due to the nature of the terrain, garden crops or horticulture have occupied as much area as food crops like paddy and other cereals. If one considers that two large tracts of the State are part of either the Western Ghat area covered with forests, or the plateau region, which in many areas is often arid and barren, then it is obvious that the area under cultivated crops is bound to be extremely limited. The horticultural gardens of Goa are therefore a well-adapted ecological response to the requirements of nature.

Cashew — The largest 'plantation' crop is the cashew. It occupies an area almost as large as that under paddy cultivation and more than two thirds of it is to be found in the non-coastal belt. The largest concentration of cashew is found in the Sattari, Bicholim and Bardez talukas.

Though the cashew brings guaranteed returns year after year, few owners of plantations look after the trees. For example little or no irrigation is given, but this may be largely because we do not have monoculture plantation as such. Cashew trees are usually found on hilly sides, mixed with other vegetation or scattered on open pastures. The trees are thinly spread and the yields are low. Farmers usually visit the trees only at harvest time.

Cashew was introduced in Goa by the Portuguese in the 16th century, basically as a soil conservation crop. It is the Christian missionaries who imported superior high

yielding types from different areas, mainly the Latin American countries. Some of these elite trees and their progeny are still available and about 65 such trees have been identified, thus far.

Today, a total of 44,520 hectares (28 per cent of the total crop area) is under cashew. In 1986 the trees produced 13,500 tonnes of nuts and 81,000 tonnes of cashew apple. About 10 lakh litres of cashew *feni* are produced annually which fetches the State of Goa around Rs 80-90 lakhs per year.

Though the production of liquor from cashew does bring the State much revenue, it is wholly inappropriate and immoral for the State to actively encourage such activities. The State has no business making money out of its people's drunkenness.

It is important to underline the fact that this vast production of nuts and cashew apple is basically produced freely by nature every year without need of pesticides, fertilisers, or large quantities of water.

Coconut — The second major plantation crop in Goa is the more visible coconut tree. Most families in Goan villages rear coconut trees and there are several landowners, including the late Joaquim Silva and Francisco Barreto, who have made the cultivation of coconut into an art. As the coconut tree thrives well in the coastal areas and near the river sides, more than half the coconut plantations are in the coastal tract.

The last official estimate we have of the number of coconut trees in Goa was made in 1954 and numbered 2.3 million. The production of coconuts has been estimated at

Red Oil Palm

About 100,000 pre-germinated seeds of oil palm were brought by M/s Godrej Soaps Limited from Costa Rica in 1991. Out of this about 80,000 seedlings were made available during 1992-93, to cover 500 hectares in various parts of Goa. Likewise, the same company intended to bring 200,000 more seeds to cover an additional area of 1000 hectares. The Directorate of Agriculture was allegedly monitoring the project in close collaboration with M/s Godrej Soaps Limited and prospec-

Oil palm cultivation in Sanguem

tive farmers who intended to go in for such oil palm cultivation.

Godrej claimed that red oil palm is a rich source for the production of edible oil. So it apparently is a case where local farmers were encouraged to neglect planting of local indigenous oil trees—for example, coconuts—in preference for an exotic oil palm species from Costa Rica for eventual use in the Godrej soap industry!

Much of what passes off as industrialised or modern agriculture has no sense. Is it our priority to neglect local crops and promote exotic varieties to suit the raw material requirements of industry? Why displace the coconut tree with the oil palm? Has the local population ever complained that coconut oil was inferior in any way when compared with other oils? Can the oil palm ever integrate with Goan life in the manner in which the coconut palm does?

At the time the Godrej Company started this project, it was headed by a committed environmentalist (S.P. Godrej) who apparently did not see the contradiction in encouraging Goan farmers to substitute their local species of trees with exotic varieties. Today, environmentalists are crying themselves hoarse and using up reams of paper on campaigns to protect plant biodiversity. Development means little more than moving around in circles.

So what further news about this oily noose around Goan agriculture? After more than a decade of efforts by 419 farmers, some 630 hectares have been brought under oil palm. Interestingly, the first mill for crushing oil palm fruit was set up in Valpoi only in January 2002. It has a capacity to process 9000 tonnes of fruit per year. What happens to the waste component? Has it any use, when compared with the coconut which has zero wastage after processing?



70 million. On the basis of one nut per family per day, it was calculated in 1980 that the internal consumption of coconuts in the territory was around 40 million per annum. Of course, coconut curries are an essential ingredient of the daily diet and Goans are generally incapable of making curries without the use of coconut. Most sweets in Goa are generally made out of a mixture of rice and coconut.

The other element of the coconut tree is that the toddy is used in the production of jaggery and vinegar and in the manufacture of coconut *feni*, another variety of liquor.

There are three well known varieties in Goa: the Siolim and the Calangute varieties which are valued for their large size and for the copra content. The Benaulum variety is much smaller but produces a good quantity of nuts. The Rivora variety comes somewhere in between. The local species are all extremely resistant to diseases and one rarely comes across large-scale mortality in any form.

At some stage Goans were induced to go in a big way for the Kerala varieties which come to fruit very early. However that drive has fairly petered out for two reasons: (1) the kernel being quite thin as compared with Goan varieties, it was wholly unsuitable for curries, and, (2) since it began producing when the coconut tree was still small, that is not very tall, pilferage was quite easy.

As it is, many coconut trees are nowadays not being properly maintained by their owners simply because of pilferage at night. This has led to the elimination of some of the characteristic coconut lined avenues of Goa—those along the Parra-Saligao stretch and along the Parra-Mapusa stretch have practically disappeared. The good news is that a new avenue of coconut trees has now been successfully established on the Guirim highway and the concerned Forest Officer in charge needs to be complimented for this.

The coconut is one of nature's wonder trees and one responsible for a sustained generation of a varied number of biodegradable products, still largely used in the village. Besides oil and oilcakes, which are fed to the animals, the tree produces fibre for ropes and matting. Even after a coconut tree falls, its trunk is carefully slit into rafters for the roof. Its leaves, both dry and green, are used for making baskets and thatches to protect Goan houses, particularly windows and *balcaos* during the

Some kind of nut !

Given the astonishing number of palm trees in Goa, it's not surprising that in Konkani (Goa's popular language), there are 51 words for the humble coconut! And Goans see to it that not one part of this tropical fruit is ever rendered redundant or wasted.

The water, self-righteously oozing vitamins and minerals, makes for a clean and rehydrating drink. Coconut water is completely sterilised by nature and is therefore a far safer bet than Bisleri or other bottled water. Further, while mineral water bottles are destroying the Goan environment including the beaches, the coconut shell, after its liquid has been drunk, completely degenerates

in the open environment, never causing any problem to anyone.

Then there's *feni*, Goa's lethal brew, proving that the coconut is not all innocence. Fish curry, Goa's gastronomic staple, would be mere fish and chilli water without the flesh scraped from our wonder fruit. But that's the obvious stuff.

We all know that coconuts are for eating and drinking, and it would come as no surprise to be told that most of Goa's sweets are made from coconut. Yet this marvel of nature is also responsible for a variety of natural, biodegradable products used all over Goa.

The fibrous shell makes for an environmentally friendly brillolpad, whilst the ash serves as Fairy Liquid. Huge spoons can be carved, and artists

stretch their imaginations when in possession of a coconut and sculpting tools.

The palm tree itself produces fibre for ropes and matting. Even after the tree has fallen its trunk is converted into foot rafters. Without the ribs of leaves to make brooms, no courtyards in Goa could respectably entertain guests. Its leaves are also used to make baskets, and the huge dried palms serve as walls for shacks and roofs.

And so it's little wonder that, every year, Goa consumes no less than 40 million coconuts!

Alas, there are some problems associated with the coconut: during the strong monsoon weather, some of them crash, bringing down electric wires and, darkness. But does anyone in Goa really ever mind this small inconvenience? Doubt it.



Dense coconut plantation at Velsao beach

heavy monsoons. The ribs of the leaves are used to produce brooms which are the basic tool for keeping courtyards clean in Goa.

Truly Goa is blessed that this bountiful tree grows in abundance in this territory.

Arecanut — The area under arecanut is around 2000 hectares and almost half of it is in Ponda taluka. The areca palm is much more delicate than the coconut tree. It requires abundant irrigation during the hot rainless months and could therefore be beneficially cultivated in the system of the *kulagars*. (See chapter 3 for more details on *kulagar* plantations). The areca is basically a shade loving tree and grows best in the company of other fruit bearing trees, which not only control the temperatures but also help maintain a moist atmosphere.

General — Other plantation crops grown in Goa are the bamboo, the banana and mango. Goa has a unique variety of bamboo which is thornless. Bamboo groves are basically privately owned. Exports of bamboo at one time were of the order of nearly 200,000 poles.

Special mention should also be made of the *bhirand* or kokum, which is part of the articles of daily diet. It is used as a garnish to give an acidic taste to curries and vegetables and for preparing cooling kokum syrup during the hot summer months. The Government of Goa many years ago had conducted a survey of the kokum in Goa. The study titled, '*Report of the Marketing Survey on Kokum in Goa*' is still available and is probably still the most comprehensive investigation of different aspects of the kokum.

POISON FREE FARMING

Chemicals-based farming was introduced into Goa by the Portuguese in the 1950s. It was largely identified with giving the soil synthetic fertilisers. Not much attention was paid to the use of pesticides. This trend has remained by and large the habitual practice of farmers in Goa.

The Green Revolution was inaugurated all over India in 1966 with the introduction of high response varieties of wheat and rice from Mexico and the Philippines. These varieties responded well to chemical fertilisers and their extended use led to the setting up of chains of chemical fertiliser plants.

The Zuari Agro Chemicals (now Zuari Industries Ltd.) was set up at Sancoale in Goa in 1974. It was based on the assumption that inputs for agriculture would now come from industries. But there was a price to pay. Fertiliser plants are listed as highly polluting by the Central Pollution Control Board. In exchange for producing fertilisers for the Goan and national markets, Zuari Industries poisoned the fish in the Cola bay adjacent to the factory, destroyed the quality of drinking water all around the plant including the Dorvol Springs, and killed the plantations in the area with strong doses of ammonia.

After more than three to four decades, the negative impact of chemicals on the soil also dawned on farmers. Synthetic fertiliser destroys the soil, especially the soil fauna, including the earthworms, and make the soil sterile. Plants grown in such soils are structurally imbalanced and become prone to large-scale infestations of pests. Goa had several attacks of the Army Worm and the Brown Plant Hopper.

Aware of these issues, a new generation of farmers has come up in Goa, which no longer wishes to use synthetic fertilisers and pesticides on any of their soils. The most successful Goan organic farmers are discussed in the pages that follows.

There is tremendous interest in these organic farming experiments and it appears that the market for synthetic fertiliser is also now gradually taking a dip. We sincerely hope that once the market for these fertilisers declines, industrial units like Zuari Industries will close down their shutters so that their continuous assault on the environment comes to a permanent halt.

Recent data, in fact, proves that yields in Goan fields have actually gone up when fertiliser use went down. The graphs below on the decline in the use of fertilisers and increase in agricultural output is taken from a draft report on Natural Resources Accounting (NRA) pro-

duced by TERI. If it is true, then the role of the Agricultural Department should now be to actively dissuade farmers from the use of synthetic chemicals.

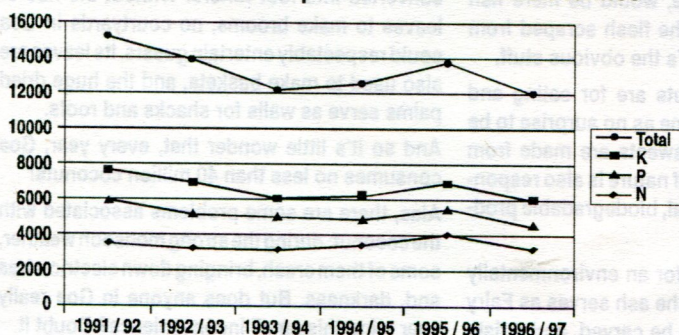
What could be the reason for the increases in output despite a reduction in the use of synthetic nutrients? Scientists believe that the moment farmers stop using synthetic fertilisers, the soil's natural fertility changes from a chemical base to a microbiological base. Whereas in the earlier system the farmer is not able to use or benefit from the activities of soil bacteria and earthworms, these become available naturally and in profusion as soon as the use of chemical fertilisers is stopped.

The addition of inputs like compost and vermicompost enhances the conditions for the appearance and flourishing of microorganisms and they come back with a vengeance. Most progressive farmers in the coming decades will resist the use of chemicals entirely and concentrate instead on increasing the microbial content of their soils. Once the soil is in a living condition, as Albert Howard once showed, it provides a vigorous climate for plants to grow.

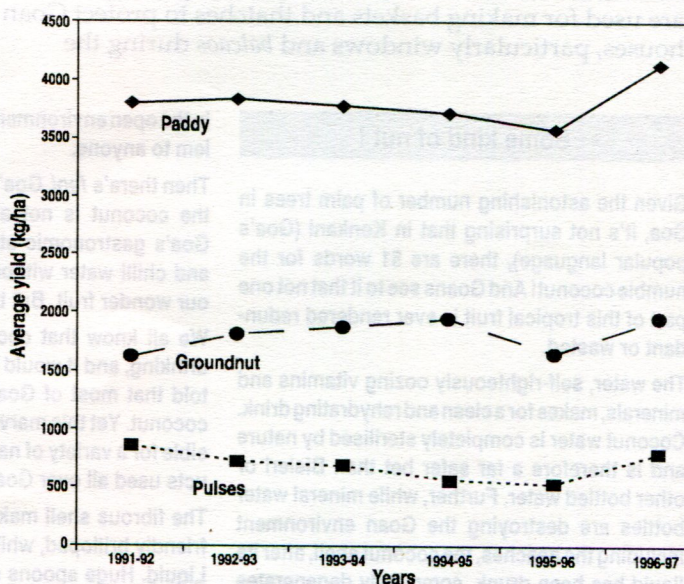
If one were to summarise the principles followed by Goan organic farmers, they could be listed out as follows:

- Nature is the best role model for farming since she does not use either chemicals or poisons nor demands vast quantities of water;
- Those farming techniques are best which are based on an intimate understanding of nature's ways. Only these can encourage sustainable use of the land as they do not assume stripping the soil of its nutrients and do not degrade it in any way;
- The soil is to be considered a living system, not an inert bowl for unloading chemicals;
- The soil's living population of microbes and other organisms is a significant contributor to its fertility on a sustained basis and must be protected and nurtured at all costs;
- The total environment of the soil, from soil structure to soil cover, is more important for a healthy agriculture than any nutrients we may wish to pump into it.

The fertiliser consumption in Goa in million tonnes



Average yield of paddy, pulses and groundnut in Goa (kg/ha)



ORGANIC FARMERS IN GOA

CEZAR GOMES

Guirdolim, Chandor, Salcete, Goa. Phone: 784278.

Cezar Gomes lives with his wife and daughter in the village of Guirdolim, about four kilometres away from Chandor (South Goa). The following is his account of his experiences with organic farming:

I have been doing organic farming from the year 1976. Prior to that from the year 1952 I was doing chemical farming. However, as years went by, I learnt to my dismay that synthetic fertilizers were ruining my soil and plants, infesting them with plenty of unknown diseases.

From 1952 to 1976 I used chemicals and the yield did go up fantastically. So much so that I was awarded a gold medal from the Portuguese Government for the highest paddy yield in Goa in 1956. By 1967, my paddy field became the most visited field in the area. Apart from neighbouring farmers, top officials including the Lt Governor came to see my paddy crop. With 15 kilos seed I produced 4000 kilos paddy per acre—an all-India record!

But then the yield started falling gradually despite higher doses of fertilizers. That was when I realised that chemical fertilisers were killing the microorganisms which enrich the soil. I then switched to horticultural crops, and decided to stop once and for all chemical fertilizers and go organic. My four principles in organic farming are:

No Cultivation — That is, no ploughing or turning the soil. For centuries farmers have thought that the plough is essential for growing crops. However, non-cultivation is fundamental to organic farming. The soil cultivates itself naturally by means of penetration of plant roots and the activity of microorganisms, small animals, and above all, the lowly earthworms and termites, both farmers' friends.

If earthworms go 10 feet up and down in the soil, where is the need of cultivating? There is no plough in the world that goes 10 feet into soil.

When the soil is cultivated, the natural environment is altered beyond recognition. The repercussions of such acts have caused the farmer nightmares for countless generations. For example, when a natural area is brought under the plough very strong unnecessary weeds come to dominate the vegetation. When these weeds take hold, the farmer is faced with a nearly impossible task of weeding each year.

In coping with such problems, the only sensible approach is to discontinue the unnatural practices, which have brought about the situation in the first place. Cultivation of the soil should be discontinued.

If measures like mulching (recycling farm wastes), sowing legumes like *Preroria*, are practised instead of using man-made chemicals and machinery, then the environment will move back towards its natural balance and even the most troublesome weeds can be brought under control.

No Chemical Fertilizers — Farmers interfere with nature, and try as they may, they cannot heal the resultant wounds. Their careless farming practices drain the

soil of essential nutrients and yearly deplete the soil. If left to itself, the soil maintains its fertility naturally, in accordance with the orderly cycle of plant and animal life.

Organic remains of plants and animals accumulate and are decomposed on the surface by bacteria and fungi. With the movement of rainwater, the nutrients are taken deep down into the soil to become food for micro organisms, earthworms and other small animals. Plant roots reach to the lower soil strata and draw the nutrients back to the surface. If you want to get an idea of the natural fertility of the soil, take a walk to the wild forest mountain side and look at the giant trees that grow without fertilizers and without cultivation. The fertility of nature as it is, is beyond the reach of imagination. Our farm soil should be like that of the forest floor.

No Weeding by Tillage or Herbicides — As weeds play their part in building soil fertility and in balancing the biological community, they should be controlled and not eliminated. A good legume ground cover interplanted with crops like coconut, arecanut, banana, nutmeg, cinnamon, cloves, pepper will effectively control weeds.

The usual way to control weeds is to plough the soil. But when you plough soil, seeds lying deep in the soil, which would never have germinated otherwise, are brought up and given a chance to sprout.

Furthermore, the quick sprouting fast growing varieties are given the advantage under these conditions. So you might say that the farmer, who tries to control weeds by cultivating the soil, is quite literally, sowing the seeds of his own misfortune.

No Dependence on Pesticides — From the time that weak plants develop as a result of such unnatural practices as ploughing and chemical fertilizing, disease and insect imbalance become a great problem in agriculture.

Nature, left alone, is in perfect harmony with all things. Pests are present but do not occur in nature to an extent which require the use of expensive poisonous chemicals. Instead cheap biological pest control can be adopted. *Neem*, curry leaves and tulsi are insect repellents. Cow urine and soap solution also keep pests away, especially on roses.

For paddy, a plant protection measure for diseases like bacterial leaf blight of rice is the spraying of cow dung slurry. Seed treatment with cow dung also reduces diseases of rice. Dipping of vegetable seeds and seedlings in *haldi* and *hing* powder reduces wilt diseases.

Similar low cost technologies are available for all crops under different farming situations.

These four principles of organic farming—no cultivation, no chemical fertilizers, no weeding and no pesticides, comply with natural order and lead to replenishment of nature's goodness and bounty.

In the old days labour was cheap, so I grew paddy. Now labour is expensive, and so I have taken up to growing cash crops, viz. coconut, pepper and arecanut. (Growing paddy in Goa has become very uneconomical due to high labour charges for harvesting of crop. It is better to grow cash crops and buy paddy which comes from other states where labour is much cheaper. My neighbours grow paddy and I cannot understand how they manage to survive.) The pepper plants grow around

the trunks of the coconut trees. I use preroria as a cover crop. It gives nitrogen to the soil as well as prevents unwanted weeds. The fallen leaves act as mulch.

I have no workers on the farm and therefore hire casual labour.

I don't really have trouble with pests but when the need arises I use homemade remedies like kerosene, *haldi*, *hing*, etc.

I had brought California earthworms, but they seem to have disappeared. I now have local earthworms and their castings have made the soil soft and porous—very nice.

I get water during the rains and from the irrigation canal which comes from the Paroda lake/dam.

STEPHEN PEREIRA

Mandovi Farms, Birondem, Sattari, Goa

A kilometre away from Pereira's rubber plantation is his 22 acre Mandovi Farm, on the banks of the Madei, the source of the Mandovi river. Only the area from Khandepar to the Northeast can use the waters of the Madei for farming.

He started in 1984, when there was nothing there. Pereira planted coconuts and fruit trees—pineapples, bananas, *papayas* and some time later mangoes and *chikoos*. More recently, he planted spices like pepper, cinnamon, some nutmeg and cardamom.

Organic manures — About four years back Pereira discontinued the use of chemicals on his farm as they were harmful to the soil, to the plant products and to the environment. The chemicals are washed into the river affecting fish and other marine life. Since farming is not his full-time occupation, he could not give attention to vermiculture or even to developing compost making to a fine art as his friend K.T. Thomas in Kerala has done. His composting is crude. Cut branches are put in pits and cow dung slurry mixed in, to decompose the material. However, he does use animal manure. To this end he started a small 10-animal dairy, mostly for the cow dung. However, it has proved economically viable besides contributing to the manure needs of the farm. For the rest of the farm's needs he now uses biofertilizers, bone meal, stera meal, *neem* cake and Mussoorie rock phosphate.

Fortunately, in this area most farms are small and use organic fertilizers because the farmers find chemical fertilizers too expensive since government has scrapped subsidy on them. However, the big farmers continue to use chemical fertilizers and pollute the soil, the food and the surrounding environment.

The farm water needs are supplied by four hours of drip irrigation every day. Small non-mechanised tools and equipment are used on the farm. He has seven permanent workers to apply fertilizer, weed, switch the drip irrigation system on for water, and do other farm operations.

Pereira's rubber plantation nearby is the largest yielding one in Goa. He uses Urea here and natural fertilizers like Mussoorie rock phosphate and for nitrogen, legumes like *Pueria leguminentus*, which grow profusely under the shade of the rubber trees and overpower weeds, reducing cost on weeding. Nature too provides. Rubber is a deciduous plant. It sheds its leaves

in December and within a month it sprouts new three petalled leaves. The old leaves cover the ground and once the rains come they degenerate and are manure for the trees. Before the rains they can be a fire hazard. The plantation is watered by a well and spring.

There are 10 tappers on the plantation and some daily wage workers to tap the 375 trees twice instead of thrice a week to prevent overuse of the trees and to save on labour. One person is overall Manager.

He has just started an apiary, with two boxes, in the rubber plantation, because rubber trees produce a lot of nectar. When the leaves first sprout the nectar oozes, one drop per triad of leaves and sometimes falls like dew. He has already been getting two and a half kilos of honey a week and during the months December to March when production is at its highest, it is 12 kilos per box. With these encouraging results he is thinking of enlarging this sphere of activity.

Farm economics — In the first two years after the change-over to biofertilizers, yields fell. However, since he is not dependent on the income of the farm, he persisted with biofertilizers. Even now yields are not back to the original, but they are encouraging.

With regard to fruit, because the durability time is short, the middle men buy at a very low rate—in the absence of cooperatives to break their hold on the market—resulting in poor monetary returns.

The coconut yield is on an average 50 coconuts per tree. The original error of planting the trees too close has prevented the yield from being better. The sale is according to local market rates. Honey fetches a good price. From spices, because they too have an indefinite shelf life, the monetary returns are good.

In conclusion, he says that he began farming because of his love for the earth, its trees, and produce. He would like to make a small contribution to the earth, particularly in Goa, whose forest and animal wealth, natural biodiversity and lush landscape, bounteous springs, rivers and ocean are being rapidly destroyed for commercial gain. He hopes he can thereby leave some of the haunting beauty and diversity he has been privileged to experience to his children's children, hopefully to the seventh generation.

FRANCIS X BORGES

47-2, Gongurem, Assagao—403 507, Goa.

(Outlet: M/s Apurbai Environmental Enterprise, Axirwad, Assagao, Goa.)

Deeply interested in agriculture and gardening, his hobby grew into a project called Apurbai. Says he: 'As teachers, my wife and I were convinced that education has to go beyond the classroom—and must help students strike an ecological balance with ecosystems through sustainable development.'

Why did they start Apurbai? For the following compelling reasons:

- Lots of harmful effects of chemical fertilizers, pesticides, etc.
- To educate people about these harmful effects and about putting less pressure on natural resources.

c. Our plants died due to overdose (less water was used, so concentration of fertiliser increased), soil became hard, too much water was required.

The Apurbai setup — 1. It has grown to be an enterprise for environmental education in which they demonstrate how people can earn without disturbing the environment. Among those things demonstrated are: garden plant nursery, agro-forestry nursery, medicinal plants, processing of fruits, cut flowers, beekeeping and honey collecting, fruits, vegetables, composting of garbage, waste, etc.

2. Emphasises the uselessness of chemicals for multiplication, growth or protection of crops.

3. Stress on recycling of all plant outputs, so no damage is done to the environment.

4. Rearing bees for increase of yield.

Precepts on organic farming — Insects have to eat some leaves or tender plant shoots—else how will they survive? Animals like birds, squirrels also have to survive—for man's survival! *Neem* oil is rarely used as a spray, (whenever need arises). Earthworms from soil provide enough resistance to plants. Mixed cropping pattern serves to protect plants.

By mulching which is required for earthworms, by using vermicompost, requirement of water is minimised. Water should be used only to ensure moisture in soil, no water logging.

Only those materials that are food for earthworms are used as manures, e.g. oil cakes, cow dung, garbage, weeds, dry leaves, plant waste, etc.

Yields decreased when shifting from chemical to organic, but once stabilised, yield increased to more than when on chemical fertilisers.

K.K. NAIK

Narciso Plantations—Off: KNN Building, P.O. Box 12, Margao—403 601, Goa. Phone: 722182; Res. 720909
Farm: Tollem, Sanguem, Goa.

Naik is a business man, who manufactures and sells fishing nets as well as machines that are used to make fishing nets. He is also an organic farmer. He has two shops in the Margao market. One that sells fishing nets and the other that sells the produce of his farm in Sanguem.

Naik passed out of St. Xavier's College, Mumbai, in the 1950s with a BSc and absolutely no knowledge of green life. On coming to Goa he was persuaded by an uncle to help out on his coconut farm in Colva. While working on the farm he heard some of the workers comment that there were other farms which were getting much better yields. He tried to find out why. On reading books he learned more about chemical fertilisers and pesticides. He



Rubber plantation with ground cover of legumes on K K Naik farm

started using chemicals like ammonium sulphate and potash. His yield increased from 16,000 to 45,000 nuts per year. Thus the result was initially good. This was seven years ago. Then for two years the yield remained stable after which it slowly started decreasing. Also trees started contracting diseases, seeds of the cashew plant started falling.

Not much later, he came across the book on natural farming by M. Fukuoka. Fukuoka strictly followed the principle of noninterference. Mr. Naik however took to 'organic farming' which involves using organic fertilisers and pesticides. He uses *neem* cake, compost (vermicompost and bio-compost which he manufactures on the farm itself), cow dung, poultry droppings and farm waste (for mulch). For pests he uses *neem* oil and its products, cow urine diluted with water in the ratio 1:5 and sprayed over the plants. He also uses a plant enhancer hs6 which is sprayed on the ground and is then absorbed by the roots.

Naik owns 130 acres of land in Sanguem. He grows coconut, arecanut, cashew, rubber, citronella, bananas, sapota, black pepper, cinnamon, etc.

How did he choose the site for his farm?

While working on his uncle's farm, he found that the harvest in March was always good in comparison with the others. On making enquiries he was told that the March crop was the result of flowering in June. Since their region was a rain-fed one (watered well only in June) only the crop that has flowered in June gave good harvest. After liberation in 1966, Naik started looking around to get his own land where there would be plenty of water so that all four harvests could be good. He found such a place in Sanguem.

Farm statistics — 130 acres of land; labourers 15 to 16 men and six to seven women; three plots rubber with 1800 trees; 15 acres citronella and 1300 coconut trees; 3000 arecanut trees and 3500 cashew trees.

Irrigation — The farm is situated on a river bank. A 50 hp pump is set up with a 16" suction pipe and the water is distributed through 9" pipes. Sprinklers and drippers are used. Drip irrigation is used for the rubber plantation.

There are also two streams that run through the farm. These are fitted with two 7.5 hp pumps. Machinery used: crusher for cashew, tractor, etc.

Multicropping—coconut trees are planted at a distance of 9-10 metres away. In between, Naik grows banana, spices and other trees. This he finds more economical because you don't rely only on one kind of crop. If one gives low yield there is always some other plant giving higher yield. Also the trees grow better when they are spaced out.

Weeding is not done. The weeds are cut down with a sickle and they become food for the earthworms and microorganisms which convert them into manure.

Using sprinklers and drippers for irrigation proves to be more economical in the long run because it saves on labour. Also when you put a lot of water at one time most of it will just flow away as the root will not absorb all the water at once. So you actually save water by sprinkling or using the drip method.

Farm economics — His yields are: coconut—100 nuts per tree per year; arecanut—three kilos per tree per year; cashew—four kilos seeds per tree; rubber—1,100 kilos per hectare and citronella oil—60 kilos per acre per year.

Growing coconuts usually proves to be expensive. A lot of fertilizers have to be used. That is why coconuts are so expensive. Wholesale rate of coconuts is around Rs 230 per 100.

Naik is the chairman of the Goa Konkan Rubber Grower's Society. He was one of the 15 Goans (including Remo and Asha Bhonsle) to be honoured last December for work in their respective fields, his being farming.

Traditional system of creating organic manures in situ, prior to raising a crop



DR. ARUN GOPAL RAO LOKARE

Mayana, Quepem, Goa.

Lokare is a 54 year old ayurvedic and allopathic doctor who gave up his medical practice to work on a farm.

Lokare started farming six years ago during which time he used both organic and inorganic inputs. Two years later he came across M. Fukuoka's book *The One Straw Revolution* which led to a change in his approach towards farming.

He had been using inorganic fertilizers to improve his yield. He now knows that chemical fertilizers only spoon-feed the plants making them absorb nutrients readily. At the same time they destroy the earthworms and other living organisms present in the soil, so the soil loses its ability to break down organic matter. This is why one has to keep on increasing the amount of artificial fertilizer applied. Fifteen years of chemical farming, says Lokare, is enough to completely destroy the soil. The only alternative was to give up chemicals and bring the soil back to life.

The change-over reduced the yield to 50 per cent at first, since it takes time for the soil to recoup. Now the yield is 75 per cent of what it was before the transition.

The Lokare farm is situated in a hilly area deep in the village of Mayana, Quepem. Lokare does farming on about 16 acres of land, the distribution of which is shown in the rough plan.

Cropping pattern —

Plot I—3 acres, banana, arecanut, coconut.

Plot II (self-irrigated)—1 1/2 acre, banana, arecanut.

Plot III—2 1/2 acres, banana, arecanut; 8 acres—cashew.

First he planted banana. When the banana trees grew he planted arecanut and coconut saplings, since these saplings need shade for their growth. He has many varieties of bananas, viz. *Saldhati* (duration of season—12 months), *Mysore mittala* (13 months), *Sona keli* (22 months) and *Bonda bali* (12 months).

The yield of bananas is around 2000 bunches per year. He finds that organically grown bananas are tastier than those grown chemically.

Only one or two of his banana trees have been affected by bunchy top disease. Organic farming has reduced bunchy top substantially.

Fungal disease which attacks arecanut, coleraga, is very negligible. No fungicides are used as it is not necessary in organic farming.

Once the coconut/arecanut saplings grow into trees he will reduce the banana in the coconut/arecanut orchard.

His other crops include sapota, mango (30 grafts) and cashew. He also grows cow pea (alsande), Fezaon (another variety of cowpea) and chillies. On plot III he also grows *tur dal*.

Fertilisers — When making the switch over to organic farming, Lokare got labourers to collect 3000 local earthworms from the surrounding area and bring them to his farm. 200 labour hours were spent to do this.

He has stopped using chemical fertilizers and instead covers the land with dried leaves, some of which are collected from the surrounding area, grass and cow dung. Seven to eight kilos of cow dung is used per tree (for arecanut). The leaves from the river bed are also collected and strewn on the farm.

Also no ploughing is done except in the chilly plot where he uses a power drill. Weeds are cut down and left as mulch.

On plot III he has dug about 500 (2 x 3 feet) pits, each of two foot depth. This he will fill with dried leaves and dung. When the banana plants on this plot have grown, enough to offer (partial) shade, he will plant arecanut saplings in those pits.

Lokare shared with us some of his homemade recipes for pest control.

To prepare *neem* based pesticide mix 75 per cent *neem* oil with 25 per cent alcohol (92 per cent proof, which you can get at any medical stores). Use 2 cc of this solution with 1 litre of water and spray by spray pump. Other pesticides that he uses are cow urine (50 ml in 10 lts of water) and Achook, a *neem*-based powder. He also uses a light trap. For this he places a lamp under which he keeps water with kerosene. The insects attracted by the lamp fall into the water and die of suffocation under the layer of kerosene.

Bacterial Activator: Here is a formula for a bacteria activator used by Lokare and known by the term '*amrut pani*'. Method of preparation: Dilute two kilos cow dung in 10 litres of water. Add 20 grams of honey (got from bees) and 10 grams of homemade ghee. Leave this out for 24 hours in sunshine and moonshine and your activator is ready to use.

This is also sold commercially under the name Cowng Tea (cow dung tea) for Rs 5 per 20 gms.

Irrigation — Water is no problem for Lokare since there is a spring on one side of the plot and a river on the other. There are only three labourers on the farm, since there is no ploughing to be done and watering is done by sprinklers. Mr. Lokare has 96 sprinklers on his farm (90 fixed and six moving). The sprinklers spacing is 12 x 18 m. He uses a 10 HP two stage pump and it takes him four hours a day to irrigate the farm. For his chilly plot he uses a horizontally fixed pipe perforated with holes of one millimetre diameter. Plot II (see rough plan) is self irrigated with a maze of channels dug around the plants. The water from a spring flowing from the upper portion of the land is stopped by a bund and this flows into the maze on plot II thereby irrigating the plants. During the rainy season the same channels serve as a drain which keeps the plants from drowning.

Marketing — The produce of his farm is sold to the Goa Bhagyatdar Society leaving some for home consumption. However, it is sold along with other produce of other farmers that may be chemically grown. So there really is no way that consumers will know whether what they are buying is organically or chemically grown.

Goa is yet to have a farmer's collective that specially markets organic produce. Many farmers in Goa are shifting to organic farming for their horticulture crops. However, when it comes to paddy most are reluctant to do so as they consider it a great risk.

KRISHNA NANU NAIK

*Nanu Enterprises, Behind Grace Church, Margao, Goa.
Farm: Krishna Plantations, Rivona, Quepem, Goa. Phone:
722677/721260*

Krishna Naik (who is also known as Bhau) is an industrialist actively involved with his sons in the business world. However, farming has been a tradition in the family for many years and he has carried on this tradition. He visits his farm once a week and has a farm manager there. He has four supervisors and 30 labourers working on the farm.

When the farm manager, Austin Pais, joined Krishna Plantations, they were doing chemical farming. Then three to four years ago fertilizer prices went up. There was also a lot of propaganda about organic farming during that time. Seminars were held and talks were given. Promoters like Keshav Naik and other persons from the agricultural department were very encouraging. Consequently, they decided that they would switch to organic farming. They made an instant switch over, resulting in a little drop in yield. That year the yield dropped from three lakh coconuts to about two lakh seventy thousand coconuts. Now it has increased to about three lakh twenty-five thousand coconuts.

On enquiring about positive effects of organic farming, Mr. Pais told us that the plants have become increasingly though not completely resistant to disease.

On 50 acres of land Mr. Naik grew mostly coconut. At the time when he was switching to organic farming the price of coconut had come down and growing just coconut was becoming uneconomical. So he decided to also grow arecanut in between the coconut. He also has banana, *papaya*, some mango, breadfruit, a few teak trees, jackfruit, pineapple, a few spices like nutmeg and cloves and vegetables like *tendli*. They also prepare saplings on the farm. Pineapple will begin to flower after two years and will bear fruit every year before the rains. The banana varieties that he grows are *sawarbondi* (used in vegetables), *raspali* both local and *ghati*, *saldhati*, etc. These yield approximately one bunch a year per tree. A few chickens are kept by labourers staying on the farm.

Inputs — They used to but have now stopped preparing compost as it requires extra labour and also it needs to be used on time or it loses its value. Instead the trees are planted in pits and it is in these pits that organic matter is dumped.

The inputs used for the entire farm are cow dung (30 trucks per year), poultry manure, green leaves, coconut husk, oil cake (six to eight kilos per year per tree).

Earthworms were brought from Pune. These survived only for one year (which is longer than they did on any other farm in the area). The next year however they had local earthworms appearing on the plot on their own, owing to the disuse of chemicals.

To get rid of rhinoceros beetle: In earthen pots they put a mixture of oil cake and cowdung slurry. The beetles

are attracted by the smell and fall into the pot where they suffocate and say good-bye.

The Quepem taluka is a hilly area. However most part of the farm is flat land, with the river on one side and hilly terrain on the other. Two pumps near the river Kushavati are used to draw up water. Irrigation is mostly by sprinklers while close to the hill it is done by flooding. Sprinkler spacing is 18' x 12'. The farm is divided into four plots (approximately) and each plot is watered after a four day gap. Four hours a day are spent on irrigation.

Close to the plantation a mining operation is being carried out which dumps a lot of silt into the river thus blocking the stream of water and sometimes this silt has to be dug out.

The common diseases seen are bunchy top in banana and mosaic in papaya. These are viral diseases and have no cure. The affected tree is chopped down. In coconut the disease is bud rot which is noticed only in the final stages. It also has no cure.

No machinery is used. However they are interested in getting a weed cutter.

Farm economics — No comparison between cost of chemical and organic farming has been done. The produce of the farm is sold in a shop at the Margao market at the same price as other produce. No special importance has yet been given to organic produce in Goa says Mr. Pais.

VINCENTE SOUZA

M/s Lulu's Farm, Near the Church, Anjuna — 403 512, Goa.

Vincent, better known as Lulu, has been marketing vermicompost together with ornamental plants for a long time. Farming has been a family tradition and he has carried it on. Since he has trouble with getting labour, as everyone seems to want to run after white collar jobs, he is not at present growing agricultural crops. He is content with growing ornamental plants and making vermicompost. He has a variety of trees/plants which he has labelled under their scientific names.

He has a coconut plantation for which he does use some chemicals. He is cutting down use of these gradually. Says Vincent: 'I have to go organic. We all have to. Otherwise we will all die.'

However, for his other plants he is totally organic. He has cattle which provide him with the dung needed for preparing compost.

Vermicompost — He cuts dried leaves and branches with a machine. This is mixed with cowdung, urine etc. and left with earthworms *Eisenia foetida* in a heap. He manages to keep the earthworms alive by maintaining the conditions necessary for their survival. When the heap reaches 30 to 40 degrees C, microflora are formed, while at 40 to 60 degrees other bacteria are formed. Once the material is decomposed, the temperature comes down and since those living organisms survive only at high temperature they die off and the compost is ready for use. This is stored under a shelter or in a room. It takes 14 baskets of dried leaves to prepare one kilo of compost which is sold at Rs 10 a bag.

He has lately been 'experimenting' with making compost through another method. He has a tank divided

into four compartments connected through pipes towards the top. There is a pipe leading into one compartment which brings in water and a pipe leading out of another compartment on the other side to let out water into the field (which at present is fallow). Cow's urine, water and waste including leftover fish is thrown into the tank and left to ferment. In about three months the water will have run out or evaporated leaving behind compost.

All his ornamental plants are grown using only organic manure: 50 per cent manure + 50 per cent soil.

GOVIND M PARSEKAR,

Mandrem—403 527, Goa.

Phone 297238 (Sch); 297223 (Press); 297281 (Res)

Starting with barren land in 1975, Govind Parsekar first planted coconut trees. Only for a short while he used chemical fertiliser for the coconut plantation. He later came across an article on organic farming written by Dabholkar of Pune in a special agriculture issue of a Marathi political magazine, *Viveg*.

In 1989, he moved his residence onto the farm where he had planted coconut trees. Behind his house he dug up the plot and filled it with organic manure. Here he planted bananas. He now uses no chemical fertilisers.

Coconut is still his main crop. He has mango and guava trees on which he does grafting. He also has papaya, pomegranate, breadfruit and jackfruit trees.

He follows mixed cropping and in the open spaces of the coconut and banana plantation, he has planted vegetables—bhendi, snake gourd, cucumber (according to the season); spices—cardamom, nutmeg and ginger. The spacing between the coconut trees is 7 metres.

He grows maize as fodder for the cows. The corn cobs are usually eaten up by the birds. Cowpea is grown for nitrogen fixing. The soil is soft and weeds can easily be pulled out. That is exactly what he does. This forms food mulch along with the fallen leaves. He frequently has problems with the bunchy top disease in bananas, which he says was brought into Goa with the introduction of the sarak variety.

Plants brought in from outside like *glyricidia* and *preroria* he says are unnecessary. The weeds form good enough green manure. Drippers and sprinklers are used for irrigation. Two wells fitted with pumps supply the water. There is scarcity of water in the months of April-May. However, the mulch helps conserve water in the soil. Sowing of seed is normally done after the 15th of May. The only fertiliser he uses is cowdung, cow urine, coconut husk and other organic wastes. He has two cows and the cowdung is used for his biogas plant. The slurry along with the cow urine is applied to the trees. The cowdung from his cows is not enough and so he buys cowdung from the neighbourhood. This invites a lot of earthworms and their vermicastings help to make the soil soft and porous. No pesticides are used.

The banana yield is 3-4 bunches/tree/season and coconut 100-150 nuts/tree/year. His produce is sold at his farm itself so he does not need to worry about marketing.

Eulalia Alvares

FLOODS IN GOA: SIGNS OF ECOLOGICAL DISEQUILIBRIUM

Global warming is leaving its footprints in Goa. Perhaps the recently discovered aerosol haze over the Indian Ocean may be amplifying the local impacts of the mischievous southwest monsoon. Natural causes apart, the massive flooding witnessed in several parts of Goa can be directly attributed to unwanted human interference with the natural ecosystems and drainage networks.

Our government works by the law of averages. It has not yet learnt the lessons from the mini-cyclonic disturbance in June 1994. During those three days, Goa was swept by cyclonic winds and it rained ceaselessly for 48 hours. Similarly, in 1999, there was a period when 32 inches of rainfall was recorded within a period of 72 hours. Such voluminous precipitation exceeds the carrying capacity of the disturbed floodplains and reclaimed low-lying lands.

The tragedy of Goa's first generation of flood-affected ecological refugees from Ambelim-Velim is a grim reminder of our disastrous ecological history. Flooding and siltation have caused havoc in the past, ruining urban centres of Chandrapur (Chandor) and Gopaka (Goa-Velha) in Goa itself.

But the flooding of late is largely man-made—a price extracted by nature for human ignorance and indifference. Politicians have actively encouraged the destruction of vegetated watersheds and hill slopes at places like Nuvem, Priol, Bhoma, Batim, Neura, Taleigao, Sancoale, Nerul, Chicalim, Cortalim, Verna, Mercedes and Old Goa, leading to a rise in the sediment load and mudflow, causing filling of low-lying lands and wetlands in Panjim, Caranzalem, Mercedes, Guirim, Mapusa, Margao, Colva, Calapur, Calangute, Baga and Arpora.

Flooding has also got accentuated due to politicians allowing constructions on floodplains of the Mandovi river at Ribandar, Miramar, Caranzalem, Old Goa and Brittona, and on the Zuari at Quelossim, Cortalim, Agasaïm, Siridao, Batim and Santana.

This problem gets compounded due to the dumping of construction debris, solid waste and the like in the Sal river in Margao, Tar in Mapusa, and the Ourem Creek in Panjim. Also, non-sustainable alluvial sand mining has deeply eroded the river banks at Deusua-Corgao, Keri, Pernem, Morgim, Colvale and Revora. Surface and urban development has been permitted in Goa without absolutely any knowledge of the local hydrography, hydrology, basin, watershed profile and natural drainage pattern.

Slowly but discernibly, an ecologically-irreversible process has been transforming the landscape and waterscape of Goa. Soon, a moment will come, a catastrophic moment, catching the government on the wrong foot, ill-prepared and shell-shocked in facing the impact of flooding and its consequences.

I have been making sustained and systematic attempts to wake up the governmental authorities, without results. In 1998, I had forewarned the government and appealed for formulation of an early warning system and a natural disaster management plan in an article in *The Navhind*

Times ('Glimpses', October 12).

To quote a paragraph from that article: 'During the coming years, Goa is more likely to witness an increasing number of natural calamities like periods of exceptionally heavy rainfall or cloud bursts, sudden but intense storms, heavy lightening strikes, flash floods, encroachment and incessant flooding in the floodplains, hill-slides and slope instabilities ...' Consistent with these projections, Goa has witnessed cloud bursts, flash floods, hill-slides—everything—but the authorities which control development and monitor the environment are not prepared to listen.

Goa's government does not even have a simple coordination setup linking the Indian Meteorological Department's observatory at Altinho and the Cyclone Warning Radar at the National Institute of Oceanography with the revenue and emergency relief authorities. They should realise that the most important aspect of disaster management is preventive control. But whenever any surface development or land use change is permitted, there is no hydrological or environmental impact assessment.

For almost seven days in June 1999, Goa's capital Panjim turned into the 'Venice of the East'. Except for the Dada Vaidya Road and the roads at Altinho, almost all roads were flooded. Receding waters left behind hundreds of pools and ponds of mosquito-friendly stagnant water. Flood waters have already seeped into the underground water mains. Citizens were soon to face another calamity—the outbreak of mosquito-borne and water-borne diseases.

Is this the model of urban development 40 years after the liberation of this state (and the end of colonial rule)? A government which has no study, no perception or understanding of the holistic nature of nature's infrastructural services, will never be able to reverse the ecologically destructive development process.

Ecological refugees of Velim village and victims of hill slides at Tariwado-Bogda-Vasco are clear examples of the human dimension of nature's fury. A similar fate awaits tens of low-lying villages with weak bunds (protective riverside walls) and hundreds of legal or illegal dwellers on unstable hill slopes in Panjim, Mapusa, Mormugao and Margao. It is high time that the government prepares a map of all such ecological, developmental hot-spots, prepares worst-case scenarios and works out a system of preventive control and rehabilitation policy for ecological refugees.

Furious storms and heavy rainfall have occurred frequently in Goa, if one analyses the data from 1901-1902. This region once had 30 inches in May 1917 and unexpectedly 8-10 inches in 1962 and December 1965. Panjim recorded 160 inches rainfall in 1942 and the rainfall intensity has crossed ten inches per day on several occasions.

But never in the past 100 years has Goa witnessed the type and extent of flooding which has taken place in recent times. If very stringent controls are not imposed to stop the rape of Goa's landscape and floodplains, the state will have a record number of ecological refugees in the twenty-first century.

Nandkumar Kamat.

THE GAVDE : ORIGINAL GOANS

They are known as *Mull Goenkar*—literally, 'Root Goans'. They are ubiquitous in Goa, wherever one sees manual labour going on—be it in the fields, on road construction sites, in quarries or in the janitor and load-carrying 'departments' of private commercial firms. They are cannon fodder for politicians across the spectrum, trucked like cattle to rallies and paraded as 'strength' in morchas. And though they are the 'root' or original Goans, they are the most wretched of the Goan earth.

Dispossessed of land centuries ago, they lived as bonded labour and serfs well into the twentieth century. After the Liberation of Goa, the Tenancy Act gave them the right to land they tilled, but their lack of resources soon made cultivation impossible. After 33 years of democracy, though by their own estimates they comprise 30 percent of the population (20 by the government's), their basic demands, raised decades ago, are yet to be met. Most indicative of their 'democratic strength', of course, is their representation in the State Legislature: a mere ten percent after the November 1989 elections and twelve and a half after the November 1994 polls.

It has now been conclusively established that the Gavde were the first settlers in Goa. Explanations about their origins are varied. According to the Gazetteer of the erstwhile Union Territory of Goa, Daman and Diu, 1979, the Gavde belong to the Astroid race and are believed to have migrated from Southeast Asia through Assam, Orissa and Bengal to Kerala, Malabar and Goa. Though the time of their migration to Goa is uncertain, it is clear that the Gavde were the first to settle in Goa even before the Aryans and Dravidians. The Gazetteer also states that the Gavde were responsible for the introduction of crops such as rice, coconut, arecanut, plantains, black pepper, etc. to this region.

The Gavde in Goa today subscribe to the view that they have acquired the community name as they stay in remote villages where their main occupation has always been agriculture. They ascribe the origin of the appellation to the word *Ganv* and claim that they migrated to Goa from Karnataka. While the Gazetteer claims that they were chiefly employed as palanquin bearers, the Gavde themselves assert that their chief occupation is and always has been agriculture. Some of them are engaged in fishing or manufacturing salt, the latter known as *Mitt Gavde*.

The Gavde now, are divided into three main sub-groups: the Hindu, the Nav-Hindu, and the Christian. After the invasion by Aryans, they adopted Hinduism as their religion, but continued their own forms of worship and religious rituals and never really adopted idol worship. During the Portuguese regime in Goa, some of them, as the Gazetteer notes, were forcibly converted to Christianity in the 17th Century. Subsequently, in 1928, some of them were reconverted to Hinduism by a religious leader called Masurker Maharaj. These reconvertees, not accepted by either the Hindus or the Christians, maintain a separate identity and are called Nav-Hindu Gavde.

These people, approximately 300,000 by our estimates, are divided thus: (a) the Hindu Gavde, dispersed in the



Gavda woman with paddy destroyed by industrial pollution

Nova Conquistas, a predominately Hindu area; (b) the Nav-Hindu Gavde, who as a result of nonacceptance, stay in separate areas called *mands*; and (c) the Christian Gavde, who are dispersed in the *Velhas Conquistas*, a predominantly Christian area. The Christian Gavde are also known as Kunbi. The Gavde, spread over remote villages, earlier lived in relative isolation. However, rapid urbanisation has led to some amount of intermingling between the Gavde and the other communities. Yet, the Gavde continue to stay together, segregated from the rest of society, and to maintain a distinct identity.

The Gavde who first came to Goa worshipped nature. A Gavda family keeps a stone and a coconut in a hole in the wall. This shrine is called *puri*. Gavde worship the *puri*, and also perform certain religious rites to appease the spirits in whom they believe. The community believes in ghosts and a caretaker who is believed to reside in a particular tree. They believe that the caretaker, called *devchar*, moves around at nights with a light to keep an eye on the village and protects them from evil. Each village has its own *devchar* and whenever a person is ill, he is offered a chicken, a special bread and rice. They also worship trees and cattle.

Even today, the Gavde are neither fully Hindu nor Catholic. They adopted Hinduism and some forms of Hindu worship or Christianity and Christian forms of worship, but have retained their own forms of worship.

The Christian Gavde visit Hindu temples in addition to observing most of the Christian rituals. A common sight in the house of a Christian Gavda is a *tulsi vrindavan* next to a cross. The Christian Gavde too believe in ghosts and

Failure to rehabilitate *kumeri* cultivators

'Kumeri' cultivation is an age-old farming practice which was followed all over India in forest areas. 'Kumeri' basically means slash-and-burn or shifting cultivation. A family or a village clears a patch of natural forest of all plants, shrubs, bushes and trees which are then burnt on the land to provide natural manure. This land is then cultivated (usually with coarse grains like nachne [millet]) for a period of 1-3 years after which it is abandoned and the cultivators move on to another patch of forest. They would return to the earlier plot of land only after a period of 15-20 years, which would give the land sufficient time to regenerate.

This kind of cultivation was possible in earlier times when the number of cultivators was small, which meant that the land would get sufficient time to regenerate before coming under cultivation again. The astonishing aspect of the system of agriculture was that it actually benefitted the forest: witness the best forests were invariably in those areas where *kumeri* was practised. But with increasing pressure on forests due to burgeoning populations as well as commercial requirements, it was felt that this system was getting environmentally harmful. The British took a number of steps to stop *kumeri*. So did the Portuguese but the policy remained largely on paper as no alternative arrangements were made for the rehabilitation of cultivators.

After liberation, *kumeri* was banned all over again, but when it was pointed out that no arrangements for rehabilitation had been made, the Government allotted some forest land to the cultivators on an *ad hoc* basis. In 1964, *kumeri* was banned once again without any alternative arrangements being made. This sparked off an agitation, which led to arrests of many protestors, but they were let off after the court took a lenient approach in view of the fact that no rehabilitation arrangements had been made. The agitation continued and the aggrieved villagers began to cultivate cashew on some forest land. The Forest Department confiscated this land and also planted cashew on some more land of its own accord. Now, there are 9000 ha. of such plantations in the possession of the Forest Department.

The Government had argued that the *kumeri* cultivators would be rehabilitated by the employment generated on these cashew farms. Even this proved illusory, as after 5-6 years the condition of these cashew farms deteriorated due to poor management. After the Forest Conservation Act, 1980 came into force, all *kumeri* cultivation is now illegal and has been largely stopped.

The rehabilitation issue simmered on for many years, until it resurfaced in a big way in 1993-94. The then Forest Minister, Pandurang Raut, assured the cultivators that he would look into the

problem and solve the difficulties of the cultivators. But due to a change of Government, this did not happen. The cultivators began to forcibly clear the cashew plantations. The Forest Department tried to stop this and in this process severely beat up some of the *satyagrahis*. The agitation turned violent and 2 police constables and 4 forest guards were severely injured.

The cashew lands have now been transferred to the Forest Development Corporation, but the returns are dismal. The solution, which the cultivators have been proposing, is that the cashew lands be divided amongst them. This does not appear to be *prima facie* unreasonable, considering that the very rationale behind the setting up of these cashew plantations was the rehabilitation of the *kumeri* cultivators.

Issues like these go on unresolved for years. Every year new developments arise which make a resolution even more difficult than earlier. In 1996, the Supreme Court passed a stringent order directing all the states to set up expert committees to identify forests, both government and forests, and to suspend any work in such areas unless prior permission had been obtained under the provisions of the Forest Conservation Act, 1980. Subsequently, many of the encroached lands also now find themselves within the notified Madei and Netravali Wild Life Sanctuaries.

spirits and they perform ceremonies to appease them similar to those of the Hindu Gavda. Thus, one can say that the Gavde have maintained their unique forms of worship which cannot be defined as essentially Hindu or Christian.

The Hindu Gavde burn or bury their dead. The Catholic Gavde bury theirs. To pacify the deceased, they take '*prasad*' from the village deity. A copper plate is handed over to the Gurav (priest) who praises the soul and declares that the soul has entered the copper plate. This plate is then handed over to the head of the family of the deceased. The plate called *Dama* is then worshipped every amavasya (no-moon day).

Most Gavde follow a traditional ritual following a death in the family. As soon as a death occurs, a messenger is sent to inform the relatives of the event. The relatives then come weeping and crying to the house of the deceased. After the body is taken to the cemetery or crematorium, the daughters of the dead person leave the house. The sons and daughters-in-law stay behind. A lamp is lit. On the third day following the death, after bathing, the family visit the village witch-doctor who reveals the reason for the demise. He is believed to maintain contact with the dead person. On the fourth day, the men shave and take food to the cemetery, to the dead man. The relatives of the dead return with *bidi*, betelnut and oil. This oil is continuously poured into the lamp. The relatives then return to their respective homes. On the twelfth day, the relatives and people attending the funeral are invited for a meal which consists of everything the dead person was fond of. After the meal is over,

the witch-doctor is brought to the house to disclose the reasons for the passing away, whether the dead person will come to the rescue of his family when faced with hardships, and to suggest remedies, if any.

The interrelationships between Gavde are characterised by strict monogamy, early marriage, selection of partners by parents and no courtship. Relationships outside marriage are not tolerated. Illegitimacy called *pottache* or *caprache* is taboo and illegitimate children are treated as outcasts.

There are special rituals for marriage, birth, death, etc. which do not exist among the Hindus or Christians. Consultations with witch-doctors prevail even now. Every village has its *Gauncar* or *Zolmi* who performs all the religious rites in the village. The *Gauncar* is consulted during each event, be it marriage, death or any internal feud. A meeting called *Bousar* is arranged at nights to discuss problems and find solutions. The verdict of the *Gauncar* is final.

The Gavde perform folk dances called *Zagor*, *Dhalo* and *Fugdi*. The festivals celebrated by the Gavde are *Intruz* and *Shigmo*. Each of the religious subgroups celebrates these festivals separately, but in the same manner.

The Gavda community believes in mythological traditions to explain their origin. They derive their distinctive culture from these beliefs. Their dress, customs, rituals, music, dance and songs all suggest that a strong bond of cultural unity prevails among all the subgroups, even though they are now formally divided.

Anita Haladi

TODDY-TAPPERS

The toddy-tapping community is one of the major occupational groups in Goa. It secures its livelihood by tapping toddy from coconut trees, distilling it into a liquor known as *feni* and selling it to the public. It is mainly a Catholic community, socially and educationally backward and falls into the lower income category of the population. Toddy-tappers do not live together as a community but are spread out all over a (primarily coastal) village.

The man climbs the tree and collects the toddy, the woman often distills it. Tree climbing is generally done twice or thrice a day; it should be remembered that a normal mature coconut tree is 30 feet high and each time, the juice that has been dripping into a pot from a tapped shoot has to be brought down. Distilling involves a shed or distillery locally known as a *batti* and certain typical vessels for distilling.

There are nearly 6000 tappers in the territory at present. Further, another 2000 workers are in the employment of some well-to-do tappers. If one adds to this the families dependent on the trade, then, according to the All Goa Toddy Tappers Association (AGTA), about one and a half lakh people form the toddy-tapping community, which is nearly one-sixth of the Goan population.

Tapping the unopened flower bunch (spadix) of the palm for the extraction of toddy is a common practice in most tracts where the coconut is cultivated. Tapping in Goa is normally done by slicing off the apex of the unopened spadix gradually and beating it with a tapping rod every day to rupture the cells and induce the flow of the sap or juice. It is usual to tap successive inflorescences in a tree for about six months. The juice begins to flow about three weeks after the commencement of the tapping, and flow from one flower bunch lasts for about a month.

Trees which yield a large number of nuts also yield a large quantity of juice. Tapping is found to improve the yield of nuts of poor bearing palms. It is stated by the experts that the beneficial effect of tapping lasts for about four years after it is discontinued. The juice can be converted into sweet or fermented toddy. Vinegar, jaggery or sugar or arrack can also be made from the juice.

Most of the toddy-tappers do not have their own dwelling place and reside in the property of another, either in a house built by their ancestors or by themselves or in a house of the owner. This gives to these tappers a legal and social status of *mundkars* vis-a-vis the landlords. Most of the tappers live in houses of mud approximately 100-150 sq m. The distillery is another 10-30 sq m. Besides there is a toilet and firewood storehouse. Thus an area of approximately 200 sq m plus an approximately 300-400 sq m open area can be said to be in the occupation of the tapper.

Traditionally, *mundkars* have not paid any rent to the *batkar* but have performed services such as looking after the *batkar's* house and property, paddy fields, coconut groves, etc. In due course legislation came into force whereby the *batkar* was restrained from evicting/dispossessing the *mundkar* from the house or amenities that he

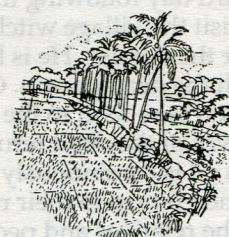


Toddy-tapper with characteristic doodkem for collecting toddy

had been using. The rights of the *mundkar* are hereditary. The new legislation put an end to the rendering of free service to the *batkar* since it was akin to 'bonded labour'.

The problem now is that the landlords, to evict their *mundkars*, have gone to court under the plea that the latter are trespassers and not the hereditary *mundkars*. Nearly 60 per cent of the alleged *mundkars* in these cases are toddy-tappers. Besides these legal problems, landlords in some cases have used physical force to evict or dispossess them and have sometimes disallowed the customary usage of growing trees or vegetables in the property of the landlords. Often they refuse to rent them coconut trees for tapping, thus depriving them of an income.

However, it must also be mentioned that there are cases, not just a few, where the *batkars* are owners of just a small property which they genuinely need to maintain themselves. The problem thus is far from being solved in the present form of struggle even though the courts have finally decided the matter in favour of the *mundkars*.



Tailpiece: Bhaille (Outsiders)

It is an epithet which you can come to dread, especially if you are one of the benighted lot so described. Used at various appropriate moments, it consigns those to whom it is addressed to the status of third-rate citizens, vaguely held responsible for all possible problems from pollution to cultural degeneration to malaria and AIDS.

Outsiders are all just that—outsiders—and so they will always remain. If one of our true-blooded Goans is feeling particularly kindly and well-disposed, he may consider an outsider who has been settled in Goa for a quarter of a century almost human. But in his world-view, they all need careful watching.

There are various grades of insiders, of course. The A-1, *pucca* insider is the person whose ancestors have been settled in Goa forever and forever, probably being planted there by God himself when he created man. Then come those whose ancestors had moved elsewhere for various reasons but who (the descendants, not the ancestors) are now back. And last come those

emigrants who visit their homeland for an occasional holiday and wax nostalgic about their love of the land over a glass (or a bottle) of *feni* in the evenings.

But those who, irrespective of how long they have been settled in Goa, are not ethnically Goan, are forever doomed to subhuman status. All insiders have a trick of saying 'outsider' in a way that satisfactorily damages the credibility of their target.

Outsiders can get upset over this attitude. They may have been here for years, even born here, but they do not really meet the mark. For that one must be part of the same ethnic group.

Goans are, of course, not unique in this attitude. Division of the world into various categories of 'self' and 'other' is a basic human characteristic and the source of much of an individual's self-image and identity. 'Self', of course, is a paragon of virtue and an embodiment of all that is good in the world, whereas the 'other' is the source of the world's troubles. (Happily, this categorisation also provides us with somebody to blame for our problems.)

Parochialism is by no means a uniquely Goan characteristic; in fact, Goans suffer from it far less than many other Indian communities and groups. But what is striking in the case of Goa is how uneasily this world-view coexists with the basic friendly and hospitable nature of Goans. In current times, these attitudes can be dangerous—

communalism usually starts with targetting the outsider, an eminently vulnerable target.

One does not have to search very far for the reason for this mistrust of outsiders—it is partly rooted in history and is partly the natural feeling of any small ethnic or cultural group which fears its identity being swamped under that of more powerful and numerous groups. Ever since the Portuguese conquest, Goa was relatively cut off from the rest of India and developed in isolation from its natural hinterland, India.

Along with jubilation, there was considerable trepidation when Goa was liberated in 1961 and integrated with the rest of India. The dawn of freedom brought with it the fear of losing a cherished identity under the powerful influence of neighbouring states like Maharashtra. In the plebiscite which followed, Goa voted to retain its separate identity. Goans further reasserted their cultural identity during the Konkani movement. But the fear still remains.

Also, the sheer volume of people from outside the State working in Goa is perceived as a threat. It is estimated that about 30% of the population ordinarily resident in the state is of Goa is of non-Goan origin; they are usually concentrated in the cities and suburbs. Besides, Goa, with its high per capita income and shortage of manual labour, acts as a magnet for workers from impoverished areas of other states. This large floating population, living in the most miserable conditions, is often blamed for many law and order and public health problems. It is conveniently forgotten that in their absence the economy would come to a grinding halt. The tone in which a true Goan says '*ghanti*' (meaning someone from over the ghats, i.e. an outsider) is a study in superciliousness and contempt.

And then, of course, there are tourists. Goa receives more tourists per year than the entire population of the state; it is but natural that locals feel threatened.

There are cultural and economic reasons as well. Many of the large industries, hotels and businesses are owned by people from outside Goa and often display a callous disregard for environmental norms and cultural sensibilities. They take away large profits from their businesses, leaving behind much pollution for Goans to enjoy. Tourists are also blamed, often with reason, for cultural and environmental degradation.

There is some validity in this reasoning, but it should not be applied indiscriminately. Plenty of Goan businesses have shown the same disregard for Goan culture and environment. Goan bureaucrats have not shown notably more concern for these issues than non-Goan bureaucrats. And the politicians who have presided over the pillage of Goa's environment are all Goans. Thus, while recognising that the fear of the outsider has some basis in fact, one would do well to apply some discernment when making these judgements.

Or one would end up falling into the trap of some Goans of the older generation who are blindly parochial. Lambert Mascarenhas has written about an elderly Goan lady who approached him after he had delivered a lecture in London.

'You must protect Goa from outsiders,' she told him, 'non-Goans should not be allowed to buy property in Goa.'

'You have been settled here for some time?' he asked her.

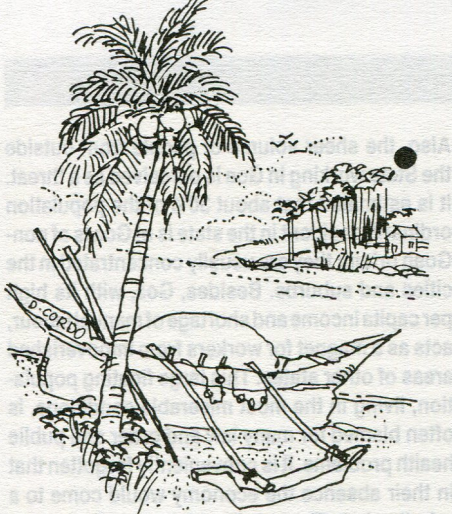
'Yes,' she replied.

'And you own a house here and other property as well?' he queried. The answer was once again in the affirmative.

'Well,' he continued, 'if you are allowed to come all the way here and own property, tell me why non-Goan Indians should not be allowed to own property in Goa.'

By an outsider





The Goan coastal ecosystem is at once the most fragile and the most threatened of the four Goan ecozones. This area includes two ecozones: the open coastal area proper, exposed directly to the sea, and the alluvial plains, mud flats and estuarine areas of another unique feature of Goa: its tidal rivers.

While the Western Ghats are now a completely protected zone, this is not the case with the coastal region, which, till 1991, continued to remain the frenzied focus of every new development from five-star resorts to aquaculture farms. The Coastal Regulation Zone notification now protects the area from the High Tide Line upto 500 metres



A view of Talpona Beach, South Goa

The Coastal Region

landward of the line and upto 100 metres from the river banks.

The issue is not merely one of preserving the scenic beauty of this area for the benefit of the tourist industry. This is the area of close interaction between sea and land; between water, winds and sand dunes; between brackish water and mangrove populations. The continued health of this region is vital for the survival of the Goan ecosystem as a whole. Two human communities, the fisher-folk and the toddy tappers, maintain and exploit niches for survival as zealously as birds do in the mangroves; their very survival is threatened by the degradation of this region.

What goes round, comes round. The sea is the source of all water that eventually falls over the Goan ecosystem as rain. In return, we appear to be bent on converting the ocean into a toxic dump into which we release all our untreated wastes and effluents. At the same time, we treat it as an inexhaustible resource, whose bounty will forever continue to feed us, irrespective of over-exploitation and maltreatment.

THE GOAN COASTAL ECOSYSTEM

The controversies focussed on tourism in Goa have reduced much of the discussion concerning the Goan coastal ecosystem to the single issue of preservation and development of the sandy beaches. This is unfortunate.

The Goan coastal system is intimately connected with the catchment areas of tidal rivers and streams. These are the source not only of water, but also of sediments, and hence, play an important part in the formation and maintenance of the coastal topography and ecosystem. The Goan coastal system has, for instance, over many centuries adapted to inputs from the rivers, particularly the Mandovi and the Zuari. Areas near the river mouths cope with natural fluctuations caused by floods and cyclones. Maintenance of these inputs from the rivers is essential for the survival of the beaches and the coastal ecosystem. To take but one instance, a good deal of the sand that is thrown up on the beaches is brought down by the rivers. Any permanent alteration of the river water flows, particularly near the salt water wetlands (as was carelessly done by the Konkan Railway Corporation with its coffer dams across the Talpona and Galgibaga rivers) is bound to have an adverse impact on the beaches.

For this reason, the Coastal Regulation Zone under the Environment Protection Act extends upto all those areas of beach and river banks where tidal influence is felt. In Goa, this influence extends upto 40 km upstream of the major rivers.

However, in this chapter, it is the active coastal area, with its beaches and coastline, as well as the immediate offshore area, that is the immediate focus of our attention. This area is physically and biologically dynamic with a close link between its biological and physical processes. In its undisturbed state, the area appears robust, having evolved to accommodate constant change on a twice-daily basis with the tides as well as extremes such as cyclones and floods. It is, however, extremely sensitive to external interference.

The marine area is also vitally important. This is the region located between the active coastal area and the edge of the continental shelf. The marine area interacts with the coastal area by transmitting waves, tides and currents and by interchanges of nutrients and marine organisms. The area contains many important marine habitats such as coral reefs, and several islands including the Anjediva and Bat Islands.

Marine Area — The marine area is populated by several plants and animals which occupy the free ocean water. They drift with the ocean currents, though some like fish and cetaceals (whales and dolphins) are able to swim and therefore determine their movements more precisely. These are the nekton as distinct from the drifting plankton. The food chain is relatively well known: phytoplankton (commonly referred to as just plankton), the smallest of the sea plants, are the main producers of the open sea. They constitute the food of microscopic animals called the zooplankton. Zooplankton are in turn eaten by larger nekton.

Within this pelagic community, the plankton supports a range of feeding levels. Many fish like the sardine and the mackerel feed directly on the plankton. Others, like the shark, feed on larger prey.

Marine turtles also belong to the ocean community but they move on to land to lay their eggs. There are a large variety of seabirds which have adapted to a pelagic habitat and, like the turtles, come to land for breeding. Such birds are responsible for a considerable transfer of nutrient elements to the shore around their breeding and roosting grounds.

The Shores — If the ocean and the continental shelf are quite actively populated, so is the shore, which is also the living area of a different set of organisms. Some of the time the zone comes under the influence of sea water and becomes part of the oceanic system. Then the sea withdraws and the zone undergoes the rigours of a terrestrial existence. Most of the inhabitants of this intertidal region have their origin in the sea and it is their exposure to air which is most stressful. A few like the birds that feed at low tide and the flies that lay eggs among the seaweed are terrestrial organisms that have adapted to exploit opportunities in an inherently difficult habitat.

Goa has two types of shores: rocky and sandy. Both rely upon two sources of food energy for their maintenance. One is the production of thick, attached algae, and the other is the pelagic phytoplankton brought in with each tide. In areas where there are mud flats, an additional source of energy is provided by the organic detritus brought down from the land.

These three areas have three differentiated communities of organisms. The rocky shore generally supports the more diverse life. Plants can find stability to root. This is not available in sandy and muddy shores. The larger seaweeds are unable to obtain a footing because of the basic instability of the soil. A few photosynthetic organisms like diatoms survive, but the bulk of the food must come in either from the sea as plankton or from the land as detritus.

The main difference between muddy and sandy shores is that the seawater can drain out faster through the sand, so that air can enter into it during low tide, bringing in enough oxygen into the pores as it drains. In mud, the



Sweet water lake on Paliem beach, Arambol

pores are much stronger and more water is held in them, so that the area is deprived of oxygen and only those animals which can survive on severely depleted oxygen levels are available here. One such animal is the crab, which often attains great population densities on the mud flats. The birds feed on the worms, crustaceans, and small fish in the soil and in the pools, in all these three areas.

It will thus be seen that the marine and coastal areas support large communities of organisms, often invisible to the naked eye, each exploiting its own specific niche. Some of these niches are created and then destroyed with the movements of the tides and therefore do not last more than a few hours. There is, in fact, precious little area in the active coastal and marine regions which is not the habitat of some organism or the other. Most of these habitats are still little understood by human beings.

STATUS OF THE COASTAL ZONE

The coastal zone of Goa had been exclusively used for agriculture, farming, shell fishing, traditional fishing and low key recreation. Native Goans used the shoreline and the hinterland water bodies to fish by using hand-cast and hand-pulled nets, gather shells for economic and various other purposes. Traditional fishing was the main economic activity of coastal populations. The only identifiable structures along the shore were a few cabins and thatched huts made of coconut tree leaves that housed seagoing canoes, some of which can still be seen today. The large plain areas behind the dune belts were

used for farming and paddy cultivation, activities which are common at certain places even at present. Recreation was restricted; Calangute, Miramar and Colva being the only beaches which were most frequented.

Ever since tourism was declared a potential revenue earner, the coastal scenario started changing. The construction boom has not spared Goa. Coastal communities have experienced a rapid growth of structures such as high rise buildings, resorts, residential dwellings, commercial establishments and beach-side bars that have mushroomed almost everywhere along the shores. Several coastal areas have changed from virtual wilderness in 1970s to haphazardly developed stretches with buildings and related structures, in less than 20 years. Some of the coastal strips are now overdeveloped in such a manner that they bear little resemblance to the coast that existed prior to development.

Tourism and related anthropogenic activities are prominent in the state of Goa. Various adverse impacts of coastal tourism have been expressed worldwide. Considering that the open sea front of Goa is being built up at a very fast pace, and that this activity is now shifting inland along rivers and backwaters, it is not fully known in what way the heavy developmental activity is affecting the coastal zone in general and the ecosystems in particular.

Coastal Ecosystems — The open sea front of Goa is characterized by a combination of beaches, rocky shores and headlands which protrude into the sea. The headlands are made of basaltic or metamorphic formations capped by laterite and intruded by igneous dykes. Linear sandy beaches are located between promontories; sandy

pockets are found at the base of coastal hill slopes; the width of the beaches varies between 50 and 180 meters. Of the 105 km long coast, more than 70 km comprise sandy beaches (including those within estuaries), all backed by several rows of 1 to 10 m high sand dunes which extend almost half a kilometer or more before merging with the hinterland coastal plain.

Five key regions have prominent sand dune complexes: Querim-Morgim with pristine beaches and turtle nesting sites; Chapora-Sinquerim belt; Caranzalem-Miramar (Mandovi estuary), the most prominent dune belt within the estuaries of Goa; Velsao-Mobor linear stretch being the longest strip of the most exquisite dune system of the entire coastal zone of Goa and Talpona-Galgibaga. In addition, the coastal stretches also consist of several sandy areas and secluded coves backed by cliffs, rocky shores, headlands or promontories and wooded or bare hill slopes. Some islands with an appreciable forest cover are found off Goa.

From north to south, the coastal zone of Goa is traversed by seven major dynamic estuarine rivers and four minor river systems. The Cumbarjua canal is the only connection between two such major rivers. Most of the major rivers which cut across hinterland formations originate in the Western Ghats. The important water ways are: R. Tiracol (28 km), R. Chapora (31 km), R. Mandovi (81 km), R. Zuari (67 km), R. Sal (35 km), R. Talpona (31 km) and R. Galgibaga (15 km). All the rivers are lined by dense mangroves, except at places. Several islands and shoals inhabited by thick mangroves are found within the rivers, the Chorao island being the most prolific.

Throughout the course of these rivers, one can find an intricate network of creeks and backwaters scattered all over the coastal zone. A luxuriant growth of mangroves (some of which are degraded) and associated swamps can be observed in most water bodies. The most prominent and extensive backwaters with mangroves are located east of the capital city of Panjim.

The coastal plain of Goa varies in width. In the northern part, it extends to about 35 km, virtually to the base of the western Ghats, whereas it is about 20 km wide in the central part. In the southern part, the coastal plain is less prominent, identified only adjacent to the two rivers; this sector is mostly occupied by evergreen forests.

In general, the coastal plains comprise an intricate system of wetlands, tidal marshes, cultivated paddy fields, all intersected by canals, inland lakes, bays, lagoons and creeks. All the rivers and the extensive backwaters in the hinterland are governed by regular tides. The prominent lowlands found adjacent to most of the rivers are locally known as *khazan* lands which are almost at, and even below, the sea level.

Human Activities along the Coasts, Rivers and Backwaters — Some of the human activities identified over the last two decades along the open sea coasts and hinterland water bodies of Goa are briefly described below:

1. *Resorts*: Since 1974, building of beach resorts is the most prominent tourism oriented activity, observed mostly along the sandy stretches, and to lesser degree along the rivers and backwaters. They are more concentrated in north Goa.
2. *Dwellings*: Migration of population towards coasts, preference for a seaside home, as well as tourism related facilities have resulted in a large number of residential dwellings mushrooming along the coastal stretches. Coastal hill slopes are also being occupied by habitations.
3. *Sand mining*: Mining of dune sands was more rampant during the 1980s than at present. However, extraction of river sand is very active in the rivers of north Goa in particular.
4. *Infrastructure*: Facilities such as laying of roads in sandy areas are common at many places where a former path existed as access to the beach. Such roads to the beach are seen at regular intervals along the entire coast.

Erosion of Agonda beach due to removal of dunes



5. *Reclamation*: Creation of new land is seen as a result of reclamation of shallow water bodies in backwaters, river banks and mangrove marshes. The largest land reclamation is seen on the eastern outskirts of the capital city of Panjim.

6. *Shoreline constructions*: Construction of structures along the water line of the open sea coast as well as the rivers are multiplying rapidly. The Mandovi estuary is one such example.

7. *Groundwater pumping*: Indiscriminate pumping of groundwater for drinking and commercial purposes is common. The stretch from Miramar to Dona Paula where every residential complex has a bore well, is one of the examples.



Galgibaga beach, also an Olive Ridley turtle nesting site

8. *Railway embankment*: A huge embankment, at places 10 m high, traverses three estuaries in south Goa, and the largest *khazan* land in central Goa. It also crosses several mangrove marshes.

9. *Barge building yards*: Repairs of barges are done in yards located along the upper reaches of major rivers.

10. *Sea walls*: Retaining walls are seen at several places as a measure to protect (and also reclaim) riverside property. Seawalls built to check erosion are also identified at Campal.

11. *Beach shacks*: These temporary huts, made of bamboo and thatched leaves, serve food to beach users, and are seen along the entire coast. Their numbers are supposedly regulated by the government. However, every year, several illegal ones also sprout up with the support of local politicians.

12. *Recreation*: This is an age-old activity on the beaches of Goa. Although restricted to a few spots in the past, many new places are now frequented by pleasure seekers.

13. *Water sports*: This activity is seen at a many places along the open sea coast, and some selected sites within rivers and backwaters. The One Man Committee appointed to examine the Miramar Beach Management Plan concluded that such sports were quite noisy and disturb the fish.

14. *River cruises*: This activity is slowly gaining popularity and momentum during the tourist season. Earlier restricted to river Mandovi, now it is conducted in river Sal as well.

15. *Offshore diving*: Amateur diving is observed only at Grande Island (off Mormugao harbour), known for the presence of corals.

16. *Sewage disposal*: Indiscriminate disposal of untreated sewage and garbage by hoteliers as well as tourists and local residents is adding to the ever-increasing problem of beach litter.

17. *Farming and pisciculture*: Traditional farming has been an age old practice. Presently, intensive aquaculture (although banned) is taking its place.

18. *Ore transport*: Transport of iron ore by barges is frequently seen along the major rivers. Ore is loaded at several points, upstream of major rivers.

Violations of Environmental Regulations — As large scale unrestrained and haphazard development had started along the coasts of the country as well, the Ministry of Environment and Forests (MoEF), New Delhi, enacted on 19.2.1991 a statute called the Coastal Zone Regulation (CRZ) Notification issued under the Environment Protection Act of 1986. The main purpose of this notification was to control and minimise environmental damage to coastal stretches including estuaries and backwaters (for a detailed note on the CRZ Notification, see chapter 12). The new legislation, however, hurt the powerful builders lobby, resort owners and influential members of the society some of whom had already acquired large tracts of prime coastal lands. Thus, the CRZ Notification was sought to be criticised, undermined and misinterpreted.

Despite clear rules and guidelines, the implementation of the CRZ notification leaves a lot to be desired. Lop-

sided developmental plans with no corresponding infrastructure facilities are being pushed. Attention is only paid to short term gains by ignoring long term effects. The result is large scale violations of CRZ regulations with consequent damage to ecosystems along the open sea front, rivers and backwaters of Goa.

The CRZ violations due to human intervention on coastal ecosystems are briefly summarised below:

Coastal structures: Based on field observations, numerous infringements on coastal sandy stretches, rivers, backwaters and plains are identified. The setback lines as stipulated in the notification are spurned. There are many such cases in the Baga - Candolim sector; the Calangute panchayat has been hauled up for the maximum number of environmental violations. The Mobor peninsula which was once declared as a green cover area, has witnessed a proliferation of structures which have violated the environmental guidelines. Many beaches, once pristine, now have a large number of buildings, some close to and even on the high tide line (HTL). Similarly, several hotels have built up river banks, and low lying areas and mangrove swamps have been filled up and portions of rivers have been reclaimed for various purposes.

Removal of sand: Sand dunes continue to be destroyed by construction activity at several sites along the sandy coasts, although this activity is prohibited by law. Unrestricted sand mining is also observed at several sites along rivers, being most conspicuous along rivers Chapora and Tiracol.

Bore wells: Since piped water supply is often irregular and does not meet the existing demands, many real estate owners and hotel promoters sink bore wells deep into the ground to tap water for maintaining artificial greenery like lawns which, though aesthetically pleasing, are ecologically unsound practices. Bore wells are not allowed within 200 m from HTL, and permission is needed outside this stretch.

Roads: In some cases, ancient paths used by beach users are slowly being converted into roads, some of which are already tarred, whereas others are incomplete and/or stopped by legal means. New pathways are also seen across mangrove swamps.

Fences: Several promoters of hotels and resorts have put up walls and barbed wire fences in the no development zone, sometimes up to the HTL. Goan landowners never resorted to such practices, and allowed free movement for the public to the beach.

Public access: Courts had to intervene in some cases so as to restore public access to the beach. Several resorts in coastal areas have indulged in such malpractice.

It appears therefore that the unplanned human intervention along the coastal zone, and also the illegal activities that have been observed, are primarily responsible for the changing coastal configuration that we observe at present.

Till November 1998, all the matters related to the development of coastal stretches of Goa were examined by a state level apex body known as the Goa State Committee for Coastal Environment (GSCCE). This committee issued licences for buildings, hotels or resorts after deliberating on various issues. Unfortunately, like all official bodies, out of twenty odd members, this committee comprised only of a few coastal scientists, the rest of

the members being from other fields with a meagre knowledge of coastal sciences. Presently, approvals are granted by the Goa Coastal Zone Management Authority, comprising eight members, appointed by the Ministry of Environment.

Fate of Coastal Ecosystems — Our ancestors had understood the nature and importance of coastal ecosystems, and had somehow grasped the sanctity of Nature. Until the 1970s, nowhere did we have evidence wherein, for example, sand dunes were razed or backwaters were filled so as to build houses. Ancestral mansions, roads, traditional villages, and any major activity along the coast were all located at safe places away from and behind the dunes, and also away from rivers, backwaters and wetlands. This type of age old planning can still be identified from Baga to Candolim, Panjim to Caranzalem, and the entire stretch from Majorda to Betul, as well as areas around backwaters. Between ancient coastal dwellings and the beach, and between ancient houses and backwaters, vast strips of luxuriant paddy fields can still be found today, being prominent in the central parts of Goa. Such places landward of dune belts thus remained as areas of peace and tranquillity, and free from anthropogenic influences. Therefore, such a setup could be cited as a unique example of the harmony that prevailed between man and Nature.

Of late, however, the pressures on the coastal area are placing this harmonious relationship under severe strain. Subversion and violation of CRZ laws, haphazard tourism expansion, constructions along the high tide line; proliferation of coastal resorts, buildings, beach shacks; unchecked sand extraction from dunes and rivers; excessive withdrawal of groundwater; constructions along coastal hill slopes; filling of inland mangrove swamps and lowlands, blocking public access to beaches, sidetracking coastal regulations, overdevelopment and concretisation of some coastal belts are among the factors leading to coastal degradation. And so today, in some places already, the coast bears little resemblance to the pristine shores that existed earlier. Combined together, all these impacts amount to one of the most powerful indictments of modern-day tourism. Therefore, the outlook appears bleak.

Our study reveals that tourism and allied activities have affected the open sea coast very severely as compared to the rivers, backwaters and *khazan* lands, where building activity is now shifting. Sandy stretches, the dunes in particular, are the worst affected. Whereas localised structures along river banks have led to significant morphological changes, the major environmental impact on the low-lying *khazans* is associated with the newly built railway embankment. The coastal hill slopes are also being encroached, and this may assume alarming proportions in due course.

The destruction of sand dunes in Goa is almost exclusively anthropogenic as has been discussed earlier. Irrespective of the agents responsible, the degradation of sand dunes pose various consequences for the coastal environment. The major drawback is that the human intervention on the sand dunes of Goa has never been quantified, an issue that requires immediate attention.

Beach shacks and recreation along Goan beaches appear less damaging. Beach shacks are a unique sight on all major beaches, and are of a purely temporary nature.



The popular Vagator beach adjoining Chapora Fort

The ever increasing competition has resulted in their proliferation, as almost 220 shacks are erected along 60 km of beach length. A sandy beach, being dynamic in nature, keeps adjusting itself towards an equilibrium as a beach generally restores itself. Therefore, beach shacks which come and go are not expected to induce any large-scale damaging effects from the environmental point of view. There are two major problems, however: one, the number of shacks which is on the rise, leading to over-exploitation of limited beach space; and two, the garbage they generate.

As shacks are frequented by a large number of people, they generate huge quantities of garbage which unintentionally mixes with sand and hence litter large areas, and invariably finds its way into the estuaries. The Baga - Candolim stretch, Miramar, Colva and even Benaulim can easily be singled out. While the biodegradable garbage gets partially cleaned out by stray dogs and cattle, the plastic waste remains on the beach and adjoining areas long after the shacks have closed down for the monsoon. At Colva, the creek is used as a dumping site for all types of waste. Hotels in south Goa produce large dumps of non-biodegradable garbage which along with sewage is discharged in the river Sal. Interestingly, large rafts of plastic waste were found floating in the river Sal; a close observation of this recurring phenomenon revealed that plastic items originate from starred hotels.

Activities of pleasure seekers and picnickers can be observed wherever sandy stretches as the dunes are found. Some dunes in Baga and in Candolim are regularly used as a football ground by the villagers and also tourists. Although these recreational activities may not be

termed as harmful to the dune environment, it does create ecological degradation in areas which are most sought and frequented. Driving of motorised vehicles on the beach, play fields on dunes, and continuous movement by pedestrians and cyclists destroys dune vegetation, flattens dunes and renders the sand mobile, factors which induce shifting of sand, thus affecting the stability of sand dunes.

Close in line with the open sea coast, the rivers and backwaters of Goa appear to be under mounting environmental stress due to a variety of anthropogenic activities. Mangrove populations are under threat due to various reasons: structures along river banks, conversion of paddy fields, reclamation of marshes for settlements, and the railway line which cuts across the entire coastal zone.

At several places, mangrove swamps and marshes bordering backwaters and *khazans* have been filled and reclaimed for various purposes. The large area occupied by the Kadamba Transport Corporation in Panjim and the proliferating buildings south of it, can be classified as the largest reclamation of backwaters during the last two decades. Road bypasses have been constructed over mangrove swamps south of Mapusa city and east of Panjim city. Significant mangrove areas were taken over and filled for the railway embankment. Mangrove forests have been sacrificed for barge building yards, as evidenced in Quellossim. Reclamation of mangrove areas which act as spawning and breeding grounds for marine organisms has been reported at Bainguinim and also at Ribandar, Santa Cruz and particularly at Talpona. Therefore, a gradual decrease of mangrove forests is a major concern.

The coastal hill slopes and even promontories are not covered by the CRZ Notification. However, wherever buildings are coming up, leaving a reasonable setback from the edge of the cliff or hill slope is imperative, be it from the safety or environmental points of view. But in reality, this rule is not observed. Negative development can be identified along the hill slopes of Dona Paula – Bambolim stretch, along the river Zuari. A large number of constructions have gradually taken over and encroached the coastal hill slopes, some of which have almost reached the water line. In addition, hill slopes at many other places adjacent to rivers and estuaries have been sliced for widening of roads as in Betim and laying of railway tracks as in Cortalim, Talpona and Galgibaga.

The environmental impacts of such actions can be manifold. Human activity along hills slopes has led to mud flows into the rivers resulting in heavy siltation at places. This is clearly evident on either side of the railway track at Talpona. Construction activity is not only spoiling coastal aesthetics but is gradually leading to the degradation, deforestation and concretisation of coastal hill slopes. Shoals and mud flats which are promptly colonised by mangroves within rivers are a direct consequence of negative impacts due to human interference along these slopes.

The low-lying *khazan* lands of Goa are now under threat due to several reasons. Indiscriminate filling of these lowlands is the concern at the moment. Although these lands are being reclaimed for settlements or dwellings, agriculture is badly affected due to human activities. Tampering with traditional sluice gates has allowed saline water into the fields due to which large fields have now turned into salty lagoons, unsuitable for paddy. Once cultivated, such areas now lie fallow and abandoned.

These lowlands have been in focus ever since the new rail line was built. Although the railway is bound to usher a new era in the region, the environmental degradation associated with building of embankments, particularly across lowlands, is significant. The impacts are seen in the form of subsiding embankments, disruption of natural drainage patterns, cutting of hills, siltation in the fields and rivers, elimination of mangroves and flooding of coastal plains, as the major part of the railway embankment is laid across coastal lowlands.

The railway which traverses the most extensive *khazan* lands of Goa from Carambolim to Cortalim, has contributed to substantial environmental degradation:

(i) Mangrove swamps have been filled at Divar, Neura, Mandur, Agassaim, Cortalim, Galgibaga, as well as a part of a natural lake at Carambolim, (ii) Cutting of hills is noted at Mayem, Divar, Carambolim, Cortalim and Talpona, mostly in and around estuaries, so as to collect mud for embankments. Large scale cutting of hills has resulted in their erosion, landslips and destruction of

hills, siltation and sedimentation of mud in *khazans* (and rivers) thus affecting paddy cultivation, (iii) Fish spawning and breeding grounds in ponds and *khazans*, traditional farming and fishing activity have been affected, (iv) Natural drainage systems which were in place for centuries have been altered leading to flooding of lowlands, rendering them saline as well as creating breeding grounds for mosquitoes. This is noticed at Mayem, Neura and Agassaim, (v) Many traditional sluice gates have been rendered non functional; natural irrigation tanks have been destroyed, (vi) The large volume of mud for high embankments has resulted in the embankments slowly sinking due to soft underlying organic marine sediments with a consequent uplift of adjacent paddy fields. At Cortalim, the bed of a creek was uplifted, thus blocking the narrow natural waterway. In this area, the environmental problems were so intense that the entire embankment was subsequently removed and a viaduct erected in its place. Unfortunately, a detailed comprehensive study of the environmental impacts of the railway in Goa has never been attempted.

The railway line has also affected rivers. Observations reveal that the coffer dams, which were laid across all

Sand dune devastated at Cavelossim for construction of resort



rivers during the construction of bridges, were never removed, except for the top part. Over a period of time, the heap of mud has been redistributed by waves and currents, leading to siltation and sedimentation within rivers. This phenomenon is most pronounced in Talpona where a large amount of coarse mud has been deposited in the estuary, a little downstream of the railway bridge. A similar effect on a lower scale is seen at Galgibaga estuary. During low tide, the river bed is exposed, indicating a drastic shoaling of the river at Talpona. Deposition of sediment in the estuary has severely hampered navigation and has also decreased the fishery potential.

Tidal rivers are also affected by activities along their banks. Many river banks of Goa are dotted by hotels,



Talpona beach (foreground) with Galgibaga beach (background)

restaurants and allied structures, identified along the major rivers at Verem, Miramar, Ribandar, San Pedro, Bainguinim, Dona Paula, Cavelossim, Betul, Mobor. These structures also include concrete retaining walls virtually in the water. Similarly, several barge/boat building yards have occupied several sites, particularly along the Mandovi and Zuari rivers, the most prominent being the Sancoale - Chicalim and Quelossim banks. The barge/boat builders are recovering large areas from rivers and extending their activities seaward. In addition to the Vasco - Mormugao port stretch, the Mandovi river bank from Panjim to Miramar, consisting of a series of jetties and even restaurants, is the most heavily built-up of all rivers in Goa. The impacts of such activities and structures within rivers is seen in the form of erosion of adjacent banks as clearly identified at Miramar, for example. Hard embankments or sea walls along the water line increase the turbulence of waves resulting in the sand erosion.

It may be noted that the coastal tropical ecosystem has a definite role to play and specific functions to perform. Any unplanned interference can prove detrimental to its intrinsic value. Coastal ecosystems show a dynamic behaviour which has to be understood, respected and not contradicted by anthropogenic influences. Coastal dune belts, for example, are among the most diverse landscapes in the world: they have multiple functions and hence are of value to society.

Mangroves play a crucial role along tropical coastlines. They are highly productive ecosystems, support a diverse heterotrophic food chain, act as spawning and breeding grounds and hence nurseries for marine biota, offer

protection from erosion, tides and storm waves and help in natural building of land and stability of shorelines. These coastal forests are important in maintaining the health of estuaries.

Goa is marked by evergreen hills and promontories with wooded or bare hill slopes which often jut into the sea. Besides controlling soil erosion and recharging aquifers, wooded hill slopes offer an intrinsic natural beauty. Forests along hill slopes also contribute towards slope stability. Therefore, coastal hill slopes particularly the wooded ones which recharge aquifers and arrest erosion need to be protected from any development.

The *khazan* lands have been a source of livelihood for many, as these lowlands were originally used for paddy cultivation, traditional farming, pisciculture and salt extraction. *Khazans* were mostly used as paddy fields for centuries, by using 'bundhs' to keep sea water away, and sluice gates to control the inflow of saline water. These coastal systems have been the rice bowl of coastal communities of yesteryears.

The rise in sea level during the last century is estimated to be 1 to 1.5 mm/year along western India including Goa. This effect may be less severe on the sandy beaches of Goa as most of them have an appreciable gradient. However, even a nominal rise in sea levels will significantly influence inland water bodies and particularly the low-lying *khazans*. Although the nature and intensity of losses cannot be predicted, the future trends in sea level rise cannot be questioned.

THE MARINE BIODIVERSITY OF GOA

Goa's marine biodiversity (on which the coastal population is largely dependent for its livelihood) can be divided into coastal and oceanic biodiversity. The coastal region, because of its easy accessibility and richness of biota, has been studied in greater detail. There have been efforts to preserve the endangered germplasm of these valuable resources.

Some of the important components of the coastal zone are estuaries and backwaters, mangroves, corals, benthic flora and fauna, the planktonic forms in the euphotic zone and fishery resources.

On the basis of available scientific data, it can be concluded that some of these ecosystems are threatened due to mismanagement and over-exploitation. Some of the major factors responsible for the degradation of these ecosystems are pollution, deforestation, reclamation and biotic interference. As a result of these man-made activities, the coastal ecosystems like mangroves and corals have been degraded to a great extent, affecting their biodiversity. Even the remotest islands like Lakshadweep and Andaman-Nicobar group of islands have started showing the impact of these factors. It is, therefore, essential to use all the expertise as well as legislative support to control this menace along with the ever-growing population of India. This is of great concern, particularly when the marine living resources from the polluted regions are utilized for human consumption.

As compared to the coastal biodiversity, the oceanic region somehow has not received serious attention so far. Although scientific efforts have been made to chart the surface water of the ocean for its productivity, the deeper parts of this region, like the abyssal depths, have remained totally unexplored. There is a great potential to explore the oceanic biodiversity of the deepest water, because of altogether different environments such as very low temperature (3 to 4° C), very low light intensity (almost dark) and tremendous pressure of the water column. To explore this unique biodiversity of deep region, Indian oceanographers will require special type of equipment such as submersibles and also suitable funding. It is interesting to note that in some of the deep Indian waters, there are hydrothermal vents where temperature rises beyond the boiling point, changing the water chemistry.

Taking into consideration the urgent need for protection of fast-decreasing biodiversity of the Goa coast, it is necessary to identify the 'hot-spots' luxuriant in biodiversity, and protect them for posterity. There are several areas like Andaman-Nicobar, Lakshadweep atolls, Sunderban mangrove forests, and deltas along the East Coast, Gulf of Mannar, West Central Coast of India and the Gulf of Kutch. In many of these coastal areas, Biosphere Reserves, Wildlife Sanctuaries, Marine Parks and Protected Areas have been declared. Along the Goa coast the estuarine mangrove species have been protected. Chorao Island, where 250 ha of mangroves are in luxuriant form has been declared as Dr. Salim Ali Bird Sanctuary. Efforts are being made to preserve the marine flora and fauna of St. George's Island off Mormugao harbour. In addition to this, crocodiles, dolphins and turtles are also now protected species.

For any successful protection programme of the natural living and nonliving resources, conservation and management plans are necessary. India, however, to some extent lacks proper laws for the protection of coastal and marine biodiversity. Although there have been recently some efforts to modify certain environmental laws like Coastal Regulation Zones (CRZ) for conservation and management, it has been observed that every time intervention of judiciary becomes essential.

Secondly, for effective conservation and management strategies along the Goa coast, the participation of local communities has so far not been effectively used. As a result of this, there have been demonstrations and agitations against a number of projects which have threatened biodiversity. It is of the utmost importance to create scientific temper, public awareness and people's participation in most of the programmes pertaining to the marine biodiversity of Goa. If we can use the traditional knowledge, experience and wisdom of the people, there should not be any problems in future to protect Goa's biodiversity. This will also become part of our national heritage. It is an urgent need to set up a National Biodiversity Register for enumerating the list of coastal and marine biota of Goa and also India. Similarly, the existing Marine Biological Information Centres, museums and laboratories along the Indian coast can be effectively connected with Goa by modern communication means like the Internet for the quick dissemination of information.

Components of Biodiversity — Goa is a small coastal state bounded by the Western Ghats, and has a coastline of about 105 km. There are 7 estuaries, sandy beaches and a rocky shoreline. The region feels the influence of the monsoons during June to September, which affects the biodiversity before and after the season.

The Goa coast is of great ecological importance. The tidal amplitude is around 1.5 to 2 m, but the intertidal expanse along the coast is limited due to the steep gradient. The climatological conditions are typically coastal and moderate. The region is comparatively pollution free.

Qualitative and quantitative distribution of marine biota along the Goa coast varies during pre-monsoon, monsoon and post-monsoon. Some of the major components of marine biodiversity are discussed below:

Phytoplankton — Phytoplankton population exhibits varied diversity in time and space in the coastal waters of Goa. Phytoplankton of this region is composed of three major groups, viz. diatoms (*Bacillariophyceae*), dinoflagellates (*Dinophyceae*) and blue-green algae (*Cyanophyceae*). Another group of organisms encountered is comprised of green algae (*Chlorophyceae*), the contribution of which is not significant. The environment in question is a diatom-dominated one with a record of more than sixty-five species, followed by dinoflagellates with fifteen species, five species of blue-green algae and four species of green algae.

Maximum numerical abundance of phytoplankton can be noticed during February-June period and also during September-November months. Diatoms, dinoflagellates and blue greens frequently form blooms.

The blue-green *Trichodesmium* is the most common bloom-forming organism in this region. Massive blooms of this organism occur every year with a marked period-

icity during February-May. This organism has the ability to fix atmospheric nitrogen. On its decay, the nutrient is released to the environment and promotes the growth of many planktonic organisms in succession.

Some of the massive dinoflagellate blooms (Red Tides) affect the fisheries of this region and also cause mass mortality of fish and other aquatic animals.

Marine Algae — The coastline of Goa with a length of 120 km has been surveyed extensively for marine algae. Altogether 77 species of algae have been collected from various places of Goa. A group-wise representation is as follows: *Cyanophyceae*—23, *Phaeophyceae*—22, *Chlorophyceae*—23 and *Rhodophyceae*—29. Habitats like intertidal, estuarine and subtidal regions are of algal interest.

The intertidal region has been thoroughly surveyed. Species of *Porphyra*, *Gracillaria*, *Gelidium*, *Ulva*, and *Sargassum* are the economically important algae occurring along this coast. Various seaweeds have been analysed for their biochemical contents and bioactive substances. Calcified algae (articulated corallines and *Padina*) have been studied for taxonomy, distribution, mineral contents, surface morphology, phenology and biological associations. But crustose corallines are remained untouched. The mangrove environment of Goa supports a few algae with low standing crop and the dominant species are *Enteromorpha*, *Caloglossa*, *Gracillaria verrucosa*, *Bostrychia*, etc. Available data on subtidal region is very scanty and is restricted to the depth of 3-6 m. Species of *Padina*, *Stoechospermum*, *Sargassum* and *Amphoroa* are common in this region.

Overall, marine algal flora of Goa is of typically 'tropical' type and shows continuity with the West Coast of India and also with the submerged banks. Algal representation is comparatively poor, both qualitatively and quantitatively.

Manglicolous Fungi — The higher marine fungi form four major groups. They are arnicolous fungi, manglicolous fungi, algicolous fungi and folicolous fungi.

Harvesting the biodiversity of the sea



There is very little information available about the higher marine fungi of Goa except manglicolous fungi (fungi growing on the submerged parts of mangrove trees). A total of 62 manglicolous fungi have been reported from Goa. The dominant species are *Halocyphina villosa*, *Massarina vellatospora*, *Verruoulinia enalia*, *Lophiostoma mangrovei*, *Lulworthia gradisporea* and *Cirrenalia pygmaea*. Out of eight species of mangroves, *Rhizophora mucronata* supported maximum number of species (52 species), followed by *Rhizophora apiculata* (52 species), *Kandelia candel* (50 species), *Avicennia marina* (48 species), *A. officinalis* (45 species), *Sonneratia alba* (42 species), *Aegiceras corniculatum* (28 species) and *Excoecaria agallocha* (9 species). There are about 15 species of mangroves available in Goa. The investigation of fungi on the remaining mangroves may reveal some more species.

Seagrasses — The seagrass beds in Goa are mostly patchy and confined to the sheltered estuarine swamps. The flora comprised of *Halophila beccarii* and *H. ovalis*. *Halophila beccarii* commonly occurred in association with mangroves in the polyhaline and mesohaline zones (salinity 5-30%). A patch of *Halophila ovalis*, was recorded from euhaline (salinity >30%) zone of Mandovi estuary. The seagrass flora from the Goa coast was observed to be relatively very poor (qualitatively and quantitatively) compared to the other regions of India.

Mangrove Flora — Goa has a total of approximately 2000 ha of mangroves distributed all along seven estuaries including the Cumbarjua canal. The mangrove flora consists of 15 species of 10 genera belonging to 7 families. The dominant mangroves are *Rhizophora mucronata*, *Sonneratia alba* and *Avicennia officinalis*. Major mangroves in Goa are recorded from Mandovi-Cumbarjua-Zuari complex with *R. mucronata*, *Kandelia candel* and *S. alba* as dominant species. Chorao Island along the Mandovi estuary has denser mangrove vegetation dominated by *A. officinalis*, *R. mucronata* and *S. alba*. Zuari estuary has about 900 ha of mangrove area with dominant species as *S. alba*, *A. officinalis* and *R. mucronata*. Mangroves are rare in the upstream region, however *S. caseolaris* and *K. candel* continue to be present. Cumbarjua canal has

mudflats on either side with quite dense mangrove vegetation of 200 ha. The southern part of Cumbarjua canal has the dominant species like *Avicennia*, *Rhizophora*, *Sonneratia*, etc.

Kandelia candel, a mangrove that is on the verge of extinction worldwide, appears in abundance along the Mandovi-Zuari complex. *S. caseolaris*, which has limited distribution along the Indian coast, is still found growing in the upstream region of Zuari estuary. The species like *Ceriops tagal* and *Lumnitzera racemosa* occurring along the north central West Coast do not occur in Goa. *Xylocarpus* species, which was reported by Cooke (1908), has completely disappeared from the coast. *Bruguiera gymnorhiza* is rarely seen and can be considered as an endangered species from the Goa coast.

Zooplankton Population — Due to the strong tidal influence, the

Mandovi-Zuari estuarine system is a highly variable and dynamic environment. Zooplankton community is dominated by herbivores. The crustacean groups such as copepods, cladocerans, mysids, sergestids, decapod larvae, prawn larvae and juveniles constitute the bulk of zooplankton. The other taxa present are polychaete larvae, ctenophores, veligers, chaetognaths, fish eggs and larvae. Copepods form the single largest taxon represented by 55 species. The temporal and spatial variations of species are determined by prevailing salinity in the estuaries. Maximum and minimum species diversity values are during dry pre-monsoon and monsoon when salinity is high and low respectively. The zooplankton community structure, diversity and species succession are intimately linked to the salinity cycle in the estuaries.

Sand Dune Vegetation — The 105-km coast of Goa stretches from Querim in North (Pernem Taluka) to Polem in South (Canacona Taluka). Survey along the sandy coastline of Goa indicates the presence of three types of shore: foreshore, mid-shore and backshore. Foreshore is regularly affected by tides; therefore dune formation is not stable and occurs only as embryonic dunes. Midshore and backshore has stabilized dunes at many places.

The pioneer sand stabilizing plants along the coastline of Goa are the species of *Spinifex*, *Ipomea*, *Acanthus*, *Clerodendron*, *Vitex*, *Spermacosea*, *Urginea*, *Dioscorea*, *Pandanus*, *Crotolaria*, *Duranta*, *Leucus* and many more. The foreshore is mostly represented by herbaceous plants, the creepers like *Ipomea pes-caprae*, *Cypreus* sp., *Spinifex*, *Littoreus*, etc. The midshore zone comprises slightly taller shrublike plants like *Duranta* etc., while from the backshore zone mostly trees are found. This sort of arrangement of herbs, shrubs and trees gives a gentle slope resulting in the diversion of the wind towards the upper region, preventing sand erosion.

Macroinvertebrates — Studies on two beaches of Goa revealed the occurrence of 47 species of macro-invertebrates belonging to 32 families. Among these, *Pisionodense indica*, *Nerine cirratulus*, *Glycera alba*, *Doanax faba*, *D. incarnatus*, *Scotollana* sp. and *Dotilla mycteroides*, *Pontharoinia unirostrata*, *Eurydice perastis* and *Gastrosaccus simulans* were most abundant species. Species diversity was relatively high in low-energy estuarine beach at Siridao than the high-energy marine beach at Candolim. Zonation of benthic fauna was discernible with high species diversity in low tide region. Heterogeneity and seasonality of benthic community structure are mainly attributed to interaction of biotic and abiotic factors. Though there are a few works on quantitative and qualitative aspects of sand-dwelling benthic fauna in Goa beaches, there are no studies on the taxonomy of macrofauna and meiofauna. Similarly there is no information on sand-dwelling microorganisms.

Wood Borers — Biodeterioration of marine structures, fishing crafts and living mangrove vegetation is quite severe along the Goa coast. The destruction is caused by at least 14 species and 1 variety of borers belonging to the molluscan and crustacean families of *Teredinidae*, *Pholadidae* and *Sphaeromatidae*. The species recorded so far include *Dicyathifer manni*, *Lyrodus pedicellatus*, *L. massa*, *Banka rochi*, *B. campanellata*, *B. carinata*, *Nausitora hedlevi*, *N. dunlopei*, *Bactronophrus thoracites*, *Martesia striata*, *M. nairi*, *Lignopholas chengi*, *Sphaeroma terebrans*, *S. annadalei*, *S. annadalei travancorensis*.

These borers, particularly the molluscs, have prodigious fecundity, producing enormous number of young ones in one brood. They have unlimited appetite, attacking any type of woody materials exposed in the sea. The attacks, because of their intensity and their fast rate of growth destroy timber within a short time of few months. All this, together with their other highly specialized adaptations, make marine wood borers man's number one enemy in the sea.

Marine Fish Fauna — The species composition and taxonomic diversity of marine fish landings in the pre-monsoon season at four important landing centres in Goa comprises 89 species of marine fishes belonging to 34 different families.

Other Fauna — In addition to the above-mentioned faunal composition there are some other groups present in Goa waters. These are as follows:

Among marine mammals, dolphins and porpoises are found along the Goa coast. Stray reports of stranded whales have been recorded. Off Mormugao harbour, there is the St. George's Island group where four species of corals are found. Similarly, in the coastal waters, four different species turtles have been reported. The crustacean group includes about 83 species of crabs and 4 species of prawns.

There are also some groups of marine animals about which there is not much information available. These include marine insects, marine birds and sponges. The macrobenthos of Goa waters comprises about 111 species, while the meiofauna is represented by 10 groups like Nematodes, Turbellarians, Oligochaets, Harpacticoids, Gastrotrichs, Halacarids, Ostracods, Polychaetes, Tanaids, Tardigrades, Kinorhynchans and Isopods. Some of the fauna are rarely observed in Goa waters. These are sea-horse, star fish, ornamental fishes, sea anemones, holothurians, etc.

There is a clear-cut demarcation between the flora and fauna of the open coast and the estuaries. Along the estuaries also the biota changes according to the substratum, salinity and the season. The substratum, like rocky shore, sandy or muddy bottom, influences the diversity of these organisms.

Seasonal changes, particularly the heavy rainfall, reduce the salinity and change the biota. Marine algae are greatly influenced by the salinity, and the 'seaweed season' is mainly from October to May. However, the salinity also triggers the flowering, fruiting and germination of mangroves. The tidal amplitude and inundation level is of significant importance in the distribution, zonation and succession of marine biota.

In conclusion, it can be mentioned that the marine biodiversity of Goa needs systematic study to fix the levels of degradation like extinct, endangered, rare, and indeterminate, out of danger or insufficiently known. In spite of the abundance of living marine wealth and clean waters, some factors are responsible for degradation of marine biota. These are population pressure, deforestation, reclamation, pollution and siltation. However, to prevent the degradation and loss of marine biodiversity, some corrective measures like conservation, preservation, restoration, research, education and public awareness are very necessary.

A. G. Untawale

COASTAL ISLANDS

Of the islands off Goa's coast, the best-known is St George's Island. St. George's Island is actually a group of three small islands. Two of these are joined together by a narrow stretch of rocks or shingle and are together called Grande Island.

The Grande Island is about 76 m high, conical in shape, rocky in nature and covered with dense trees on top. There is a rocky cliff along the side of the island which tapers down gradually at a few places, enclosing small rocky or sandy beaches.

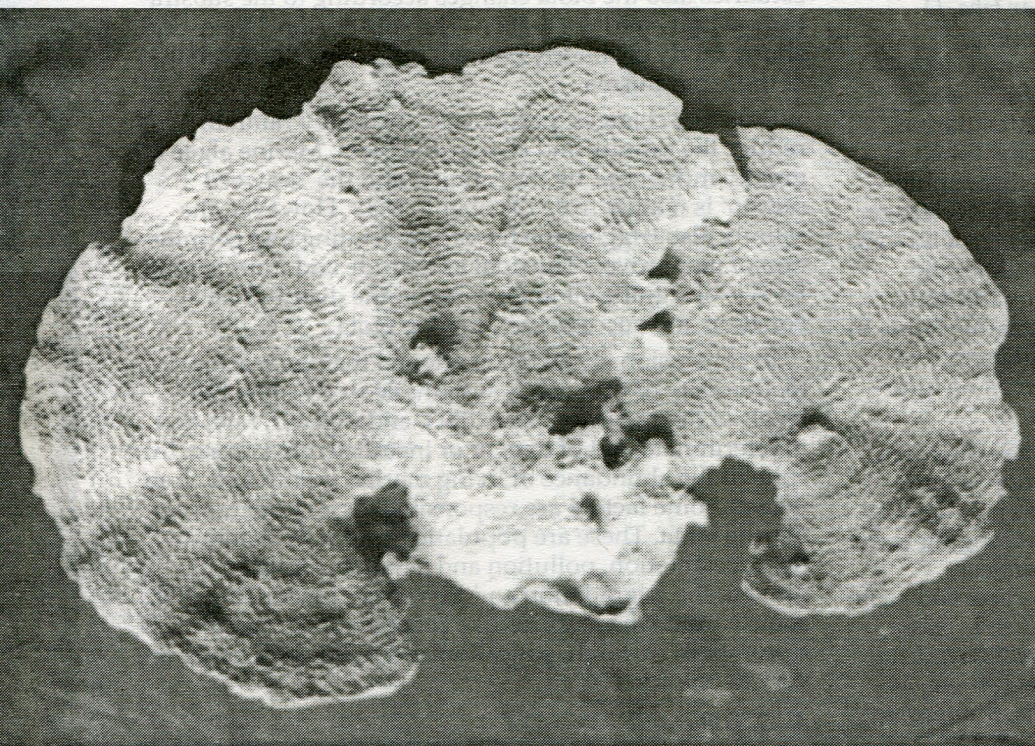
The Pikeni Island is the third island of the group and lies about one and a half miles northeast of the Grande Island. It is round with a flat top covered with trees. This island has features similar to Grande Island.

Dr. A G Untawale and his associates at the NIO have done some studies of this island group and their work has succeeded in uncovering a wealth of biodiversity here. Much of the information given below is taken from their work.

Terrestrial biodiversity: Not much information is available about the flora and fauna of this group of islands. However, it has been observed that fairly dense forest with trees growing upto a height of 7 to 10 metres exists on this island. A large number of terrestrial and marine birds have their breeding sites on these groups of islands. Wild life on this group of islands needs to be studied in detail.

Marine Biodiversity: The marine biodiversity around this group of islands is quite rich. It is comprised of seaweed flora, invertebrate species, corals (soft and hard), sponges, gorgonians, turtles, fishes (including ornamental fishes), lobsters and birds.

Coral: *Poritus lutea*



About 19 seaweed species belonging to *chlorophyta*, *phaeophyta* and *rhodophyta* groups were recorded from the vicinity of these islands. The major seaweed species recorded included *Ulva fasciata*, *Enteromorpha* spp., *Spatoglossum asperum*, *Sargassum* spp., and *Gracilaria corticata*. The most dominant was *Sargassum* followed by *Gracilaria*; both are found in the infra-littoral zone. These two species are commercially very important.

The subtidal flora show a high degree of diversity among the seaweeds, sponges and gorgonians. The species recorded from these sites were *Sargassum* spp., *Stoechospermum* sp., *Padina* sp., *Amphiroa* sp., etc.

There is no proper record of the fish landing from the vicinity of these islands. However, local enquiries revealed that the area is rich in fishery. Some ornamental fishes have been observed from seaweed and coral areas along with juvenile lobsters in the crevices of the rocks. Different species of marine turtles can also be spotted. It is likely that turtles use the nearby undisturbed mainland beach for nesting.

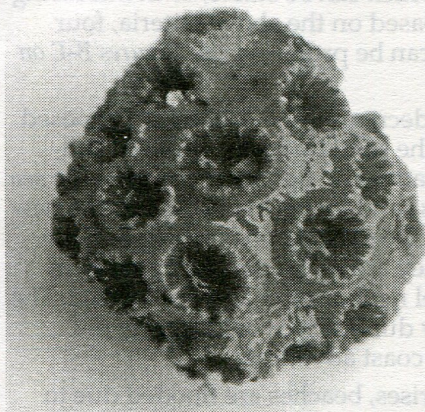
Corals — Coral reefs are often described as the rain forests of the marine world, such is their ecological importance. This group of islands is surrounded by fringing reefs, and water depth in the sheltered and shallow bays varies from 2.8 to 4.8 metres. 2 species of stony coral and 7 species of branching coral inhabit these waters. Commonest genera are *Goniastrea*, *Siderastrea*, *Porites* and *Fungia*. The associated biota is rich and diverse which includes gorgonians, shells, sea urchins, sea cucumbers, brittle star, star fish, octopus, sea horse and sea weeds. Some rare red corals have also been recorded from these island sites.

Coral reefs are unique because they are so rich in animal life and because they take many hundreds of years to develop. The primary requisites for good coral growth in a given reserve are hard substratum, average water temperature not below 18°C average, salinity not below 30 ppt and low turbidity.

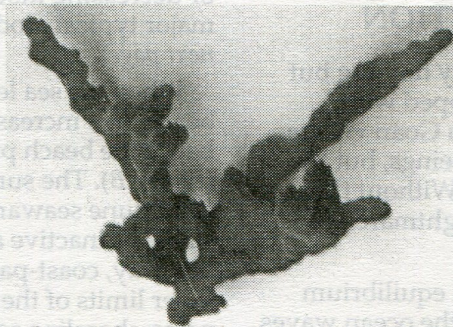
One of the causes of destruction of reefs is that they become buried in silt with runoff from eroded hillsides. They are also polluted by sewage that is pumped out to the sea. In addition, fisherman hunt in the coral reefs to catch fish, which they sell either for food or as aquarium fish.

Coral reefs are the most productive of marine ecosystems. The marine biodiversity around coral reefs is extremely rich and comprises of sea weeds, invertebrate species, turtles, fishes, lobsters, etc. Because of this high productivity, their natural gross productivity is in the range of 2000-5000 gms/cm³. The environmental contributions of coral reefs have been valued at \$ 47,800 per square foot, just for their shore protection function alone.

Human activities has been responsible for damage to coral reefs in a number of areas, with varying



Red Coral *Tubastrea* sp.



Black Sponge *Haliclona* sp.



NIO

degrees of impact ranging from negligible to massive. Notable among these activities are collection of coral, shells and ornamental fishes using destructive fishing methods, metal pollution, mining discharges, construction activities, recreation and tourism. Even anchoring of boats at the reefs can be harmful.

Archaeological value — The area also has archaeological importance. There is a shipwreck lying on the eastern side of the reef. Various types of terracotta artifacts such as inscribed bricks and roofing tiles, wall fixing or flooring tiles and a number of household decorative materials have been recorded. The roofing tiles and bricks are inscribed, 'Basel Mission Tiles Works 1865', which is probably the name and date of establishment of the company on the Karnataka or Kerala coast where they were manufactured. All these artefacts are lying in a scattered manner in 15 m water depth. The timber of the ship also lies in between the rocks along with a huge number of tiles and bricks. During highest tide, the reef is totally submerged, and it is likely that the vessel struck against the reef and sank.

Need for a Marine Sanctuary — It has been a long-standing demand that this group of islands be declared a marine reserve; else its unique ecosystem may come under threat. Based on the background research done by NIO scientists, the Forest Department had prepared a proposal for a marine sanctuary, but this appears to be

stuck due to objections from the Navy which feels that this group of islands falls within its firing range. It would be best if an alternative site could be found for the Navy's activities, in order that these islands and their unique biodiversity are preserved for posterity.

Palolem Island, Canacona — Not much is known about this island moored just off the Palolem beach. The island is so close to the mainland that it can be accessed during low tides.

In recent years, covetous eyes have descended on the island's pristine environment with a desire to turn it into an exclusive area for tourists. All islands are declared CRZ-I in the Goa State Coastal Zone Management Plan, so it is not possible really to construct anything on them. Despite this, four huts came up mysteriously on the island as a prelude to *pucca* construction. The Goa Foundation moved the High Court and got an order requiring their demolition. This, however, has not deterred interested parties.

Fresh proposals have come up before the Goa Coastal Zone Management Authority for construction of a resort on the island. The last such proposal even came with a 'technical opinion' in favour of the project written by Dr. M Baba, a scientist from Kerala. Dr. Baba is in fact a member of the Kerala Coastal Zone Management Authority. However, the Goa Coastal Authority stood firm and rejected the project.

Book Review

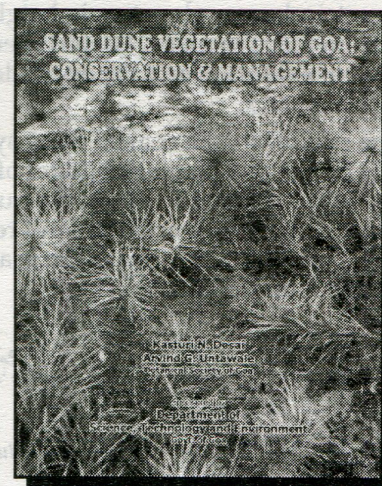
Sand Dune Vegetation of Goa: Conservation and Management by Kasturi N Desai & Arvind G Untawale (Botanical Society of Goa)

Copies from Department of Science, Technology and Environment, Saligao Plateau, Bardez, Goa.

This amazing new book is actually a manual offering expert information on all aspects of sand dunes and their protection. It begins with a detailed section on the formation of dunes, their distribution in Goa and the classification of the sand dune vegetation. The second chapter deals with the structure and function of coastal dunes.

The most important aspects of the manual are the methods described for sand dune conservation and encouraging indigenous sand dune vegetation on these sandy structures. The manual provides the description of each of the sand dune species, with illustrations for easy identification. There are eight pages of colour pictures on the different species sand dunes found on Goan shores.

This is an important contribution to the library of every person concerned about the environment, and should be made a part of the curriculum of all courses dealing with environmental education.



SAND DUNES: AN INTRODUCTION

What on earth are sand dunes? Ostensibly nothing but mounds of drifted sand on the beach, topped with vegetation one does not normally see in a Goan village. Sand dunes were not put up by human beings, but by nature, and can be millions of years old. Without them, habitation on the coastline would be a nightmare, extremely difficult, if not impossible.

Sand dunes are a sign of the ecological equilibrium between the powerful physical forces of the ocean waves, wind, tide and current on the one hand, and the natural resistance of the land on the other. A stable sea shore has two main lines of sand dunes: a sea dune which runs along the sea shore, and a land dune which runs parallel, but about 100 to 500 meters away from the sea shore. In between those two lines of dunes lies a sandy plain with minor dunes and coconut palms.

Formation, Significance and Uses of Sand Dunes —

The main prerequisites for the formation of sand dunes are wind, sand and vegetation, three elements with complex and dynamic interactions. Wind plays the most important role; its direction, frequency, duration and speed are to be considered as only winds with a speed greater than 16 km/hour can lift, displace and transport fine dry sand. This is more so along low gradient beaches particularly when they are subaerially exposed at low tides, and when strong winds blow perpendicular to a particular coast.

The vegetation which constitutes inland plants that grow immediately behind the beaches also plays a key role in dune formation since these objects act as wind breakers due to which wind is forced to drop sand along its path. Vegetation thus traps and stabilises moving sand. These plants are adapted to an inhospitable environment characterized by a mobile substrate, saline atmosphere and a regular bombardment of moving sand.

The first step in the formation of a dune, by plants tolerant to salt, is a berm which is an accumulation of sand brought up by the waves on the beach at a point just above the highest high tide (See figure A next page). These plants flourish with the organic matter brought by high waves during storms or heavy winds. The berm swells due to the eolian import of sand. Thus, these small sand mounds which form, finally develop into a continuous chain of sand dunes. These eolian bedforms can be symmetrical, several meters in height and can vary in size from place to place. Their dimension depends on the degree of evolution and the aptitude of vegetation to trap and retain sand.

The evolution of a coastal dune system strictly depends on the sedimentary budget of the beach which refers to the relation between the quantity of sand brought in by winds and the sand removed by tides and littoral currents. Their evolution is also dependent on the condi-

tions of the sea level which can be stable, or in increasing or decreasing mode. Based on the above criteria, four major typical models can be proposed (see Figures B-E on next page).

When the sea level decreases, the subaerially exposed beach area increases; the sand budget is positive and hence the beach progrades and advances towards the sea (Figure B). The surplus sand that is available forms a new sand dune seaward of the existing ones which become stable or inactive as they are no longer fed by sand. In this way, coast-parallel new dune chains are formed. The inner limits of the new dune strip would signify the paleo-shoreline as the coast advances.

When the sea level rises, beaches are flooded due to which they narrow down and thin out; thus, the sand budget is negative. In such a case there is hardly any possibility for the formation of new dunes; only a low berm with minor vegetation is normally found (Figure C). In such situations, high waves often wash over the dunes accompanied by erosion of the sand body.

When the sea level is stable, the sand budget is in a state of equilibrium. Therefore, the shoreline remains stable and so is the adjacent dune belt with individual dunes which are broad and high (Figure D).

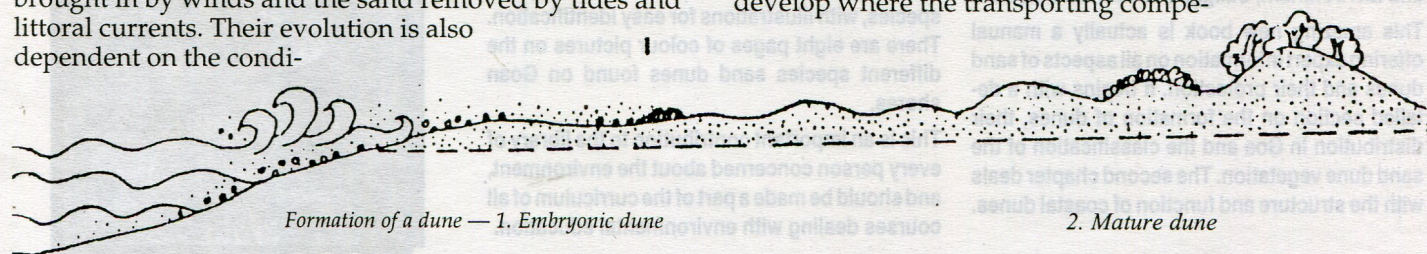
When the sea level shows an increasing tendency, as is the case world over at present, the sand budget is slightly negative. In such a case, there is a consequent sediment starvation; high waves and stormy seas force the shoreline to retreat, resulting in a landward migration of the sand dune and shoreline as well (Figure E).

The above models depict various stages of sand dune evolution and hence the evolution of the coastal landscape on a geological time scale, depending upon the environmental conditions. However, it is the model shown in Figure E which should generally be applicable at present, considering the fact that the global sea levels are on the rise. This criteria has to be considered and be given due importance in the planning and management of open sea fronts.

Why Sand Dunes Are Needed — Coastal dunes show a dynamic behaviour which has to be understood, respected and not contradicted, as is often being done, by anthropogenic influences, as dunes cannot simply follow a pattern which is not naturally theirs. Thus, their intrinsic value is lost and as a result consequences are noticed on the beaches with which they are associated. A sand dune belt has multiple functions and is hence of immense value to coastal populations:

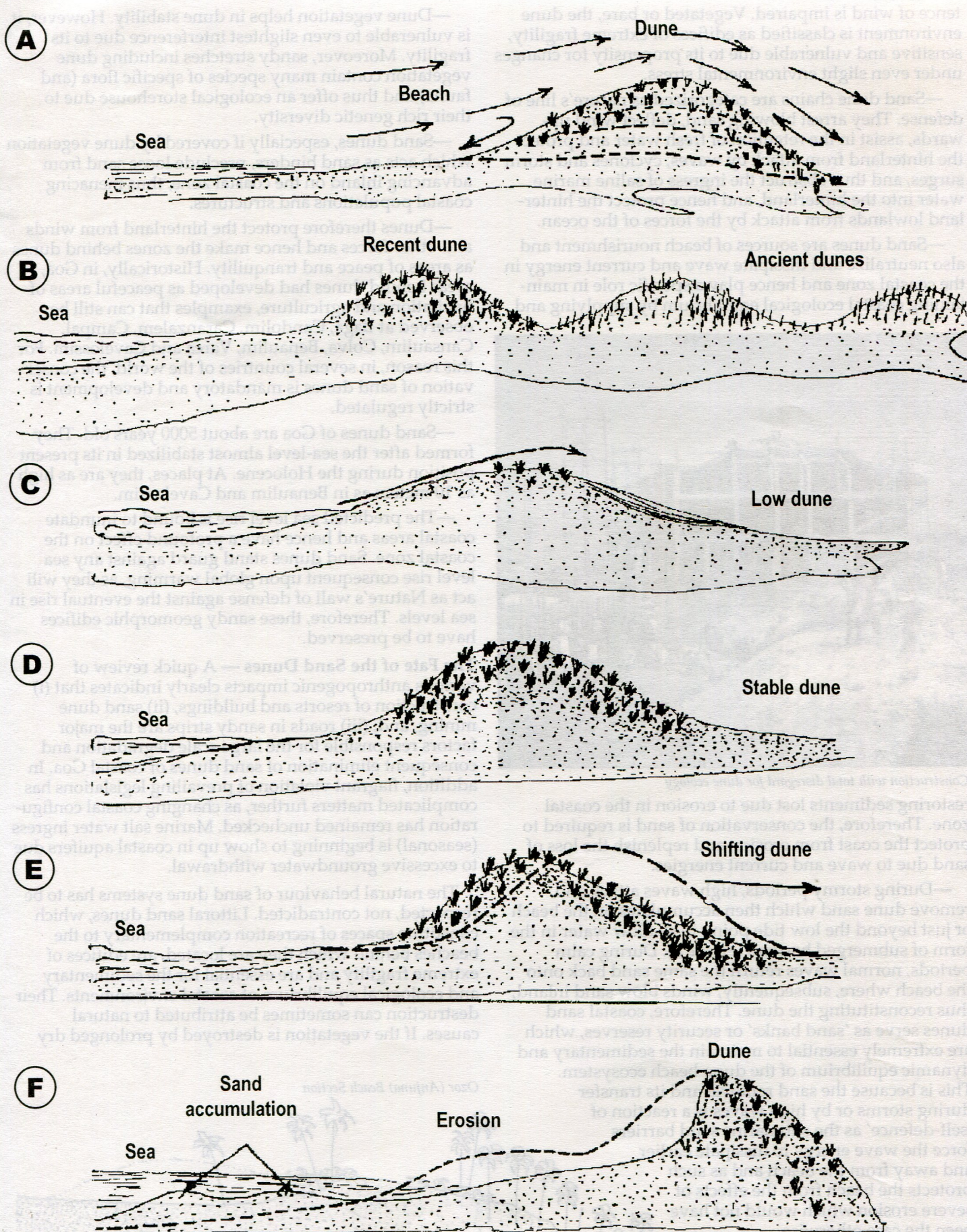
—The beach-dune environment is a highly organized system, the result of a delicately balanced ecological equilibrium between the forces of the ocean and loose coastal sediments. Dunes are typical features of coastal stability.

—Sand dunes are eolian bedforms and develop where the transporting compe-



Formation of a dune — 1. Embryonic dune

2. Mature dune



Graphics by Antonio Mascarenhas

tence of wind is impaired. Vegetated or bare, the dune environment is classified as edifices of extreme fragility, sensitive and vulnerable due to its propensity for changes under even slight environmental stress.

—Sand dune chains are categorized as nature's line of defense. They arrest blowing sand, deflect wind upwards, assist in the retention of fresh water and protect the hinterland from attack by waves, cyclones and storm surges, and thus obstruct the ingress of saline marine water into the hinterland, and hence protect the hinterland lowlands from attack by the forces of the ocean.

—Sand dunes are sources of beach nourishment and also neutralize and dissipate wave and current energy in the coastal zone and hence play a specific role in maintaining coastal ecological equilibrium by supplying and

—Dune vegetation helps in dune stability. However, it is vulnerable to even slightest interference due to its fragility. Moreover, sandy stretches including dune vegetation contain many species of specific flora (and fauna) and thus offer an ecological storehouse due to their rich genetic diversity.

—Sand dunes, especially if covered by dune vegetation which acts as sand binders, preclude loose sand from advancing inland on the coastal zone, thus menacing coastal populations and structures.

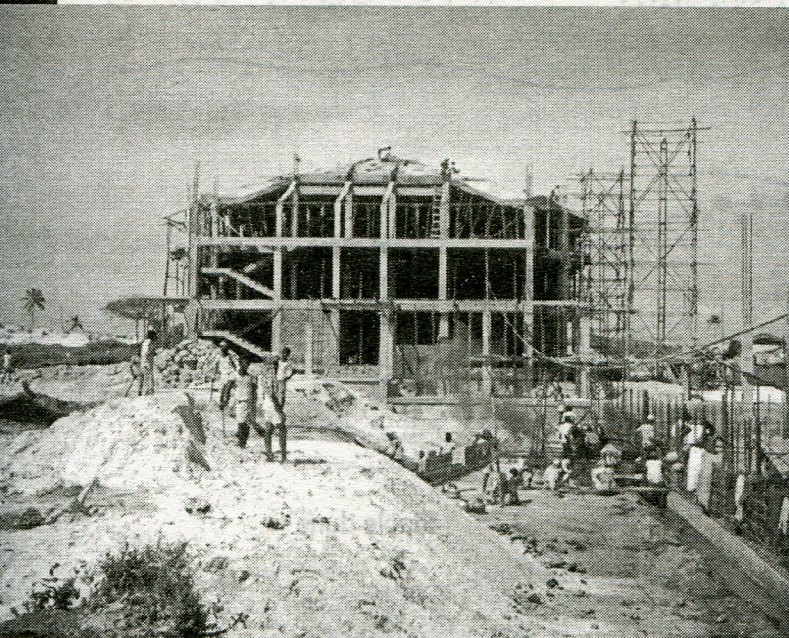
—Dunes therefore protect the hinterland from winds and other forces and hence make the zones behind dunes as areas of peace and tranquility. Historically, in Goa, areas behind dunes had developed as peaceful areas of habitation and agriculture, examples that can still be observed at Baga, Candolim, Caranzalem, Campal, Cansaulim, Colva, Benaulim, Varca and Cavelossim. For this reason, in several countries of the world, the conservation of sand dunes is mandatory and development is strictly regulated.

—Sand dunes of Goa are about 5000 years old. They formed after the sea-level almost stabilized in its present position during the Holocene. At places, they are as high as 10 meters as in Benaulim and Cavelossim.

—The predicted sea level rise is bound to inundate coastal areas and hence have a profound effect on the coastal zone. Sand dunes stand guard against any sea level rise consequent upon global warming, as they will act as Nature's wall of defense against the eventual rise in sea levels. Therefore, these sandy geomorphic edifices have to be preserved.

The Fate of the Sand Dunes — A quick review of various anthropogenic impacts clearly indicates that (i) construction of resorts and buildings, (ii) sand dune mining, and, (iii) roads in sandy strips are the major factors responsible for the large scale degradation and consequent elimination of sand dunes of coastal Goa. In addition, flagrant violation of prevailing legislations has complicated matters further, as changing coastal configuration has remained unchecked. Marine salt water ingress (seasonal) is beginning to show up in coastal aquifers due to excessive groundwater withdrawal.

The natural behaviour of sand dune systems has to be respected, not contradicted. Littoral sand dunes, which constitute spaces of recreation complementary to the beaches behind which they are located, are edifices of extreme fragility and are essential for the sedimentary and ecological equilibrium of coastal environments. Their destruction can sometimes be attributed to natural causes. If the vegetation is destroyed by prolonged dry

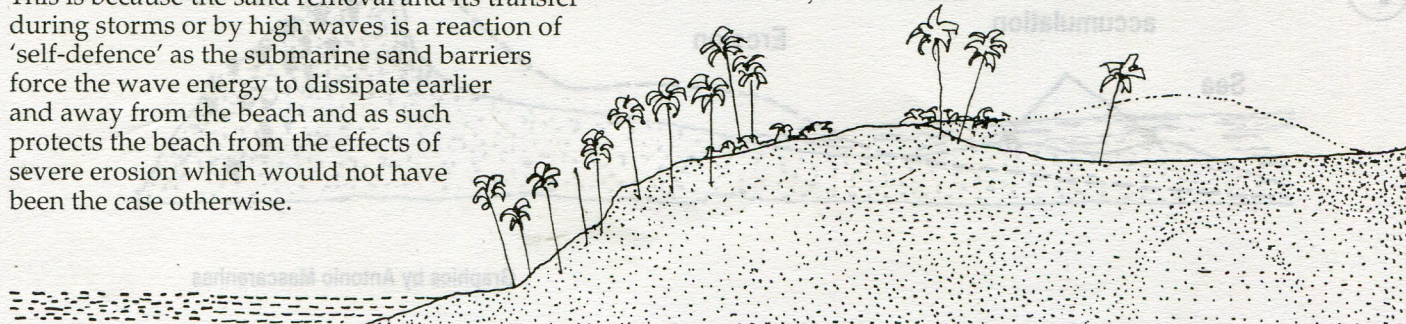


Construction with total disregard for dune ecology

restoring sediments lost due to erosion in the coastal zone. Therefore, the conservation of sand is required to protect the coast from erosion and replenish the loss of sand due to wave and current energies.

—During stormy periods, high waves attack and remove dune sand which then accumulates on the beach or just beyond the low tide point, in shallow water in the form of submerged barriers (Figure F). During calm periods, normal waves return the same sand back onto the beach where, subsequently, winds blow sand inland, thus reconstituting the dune. Therefore, coastal sand dunes serve as 'sand banks' or security reserves, which are extremely essential to maintain the sedimentary and dynamic equilibrium of the dune-beach ecosystem. This is because the sand removal and its transfer during storms or by high waves is a reaction of 'self-defence' as the submarine sand barriers force the wave energy to dissipate earlier and away from the beach and as such protects the beach from the effects of severe erosion which would not have been the case otherwise.

Ozor (Anjuna) Beach Section



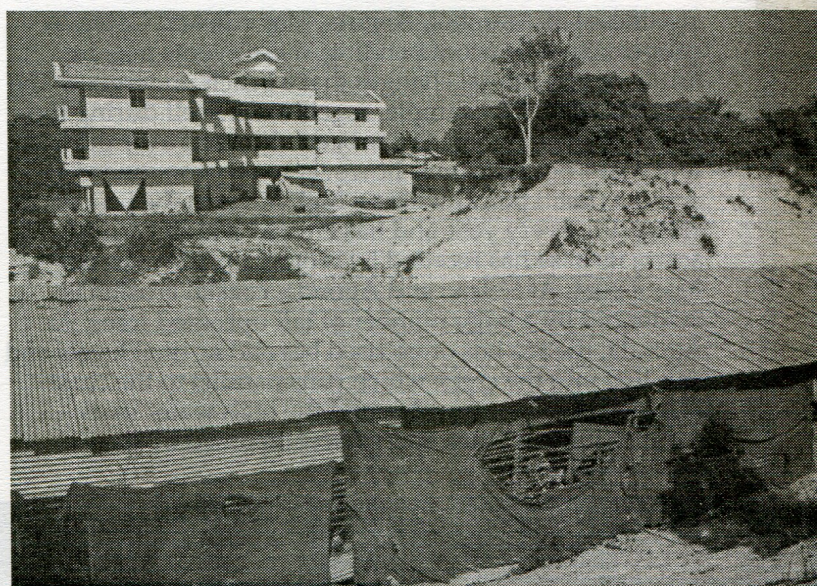
periods or other reasons, they are destabilised as they are laid bare. If, subsequently, a dune is cut by high waves leaving an escarpment, the latter is capable of increasing wind speed manifold. Wind then opens cavities through which free sand is liberated and bombarded inland thus attacking populations and buildings located along its path.

The destruction of sand dunes in Goa is exclusively anthropogenic. Although they had remained free from human intervention, they are now too-frequented subsequent to the promotion of coastal tourism. They have thus suffered greatly from the assaults of tourism and other related activities which have spread over coastal spaces during the last two decades or so. Their existence is therefore in peril: destabilisation due to the degradation of their vegetation which is sensitive to the human presence, flattening due to sand extraction, or their destruction and elimination due to the creation of plots by the sea side. Their disappearance is total where sand is being extracted for construction activities, and also where dunes have been simply leveled and flattened to erect buildings and resorts.

Similarly, the destruction of dune vegetation which is crucial as sand binders appears to be exclusively anthropogenic and is attributed to several factors discussed above. In several areas, the frequent visits of picnickers, tourists, revellers, vehicles, cycles, etc have rapidly degraded sand dune vegetation which is particularly sensible to human interference. Recreation can have adverse effects on sand dunes. Native plant species are prevented from colonising because of the preference for lawn grass and exotic shrubs for landscaping. Real estate developers and owners of resorts have replaced natural vegetation with gravel, cemented paths, or simply maintained an unvegetated barren surface which is used for other purposes such as parking. Natural dune vegetation can only be seen on stretches which have so far remained free from development.

The damage and destruction of dunes, irrespective of the agents responsible, pose various consequences for the coastal environment. Disrobing a sand dune results in the formation of free sand which is rendered mobile, and therefore keeps shifting. Along the coast of Goa, the transfer of sand landward far into the hinterland is a common phenomenon observed particularly during windy days at several places; the Baga-Candolim sector is one such example. This phenomenon is most pronounced at Miramar where large accumulations of sand are often noticed on the road. The risks of inundation are increased when sand is removed on a large scale. Excessive pumping of fresh water leads to salt water ingress and contamination of coastal aquifers. Elimination of dunes also induces erosion, as beaches are starved of the requisite sand budget. All these factors adversely affect coastal equilibrium and hence its stability.

It has been demonstrated that coastal buildings alter wind flow around them and reduce the velocity on the lee. Structures built on dunes induce localised deposition, cause local increase in the height of the dunes and reduce the



Resort constructed on sand dunes (Cavelossim)

inland migration of the dunes. Even a moderate development on dune belts strongly affect sediment transfers. Buildings also change the location of accretion and scour on beaches and dunes. Large buildings cause a reversal of regional wind flow; windblown sand accumulates against buildings, houses, boardwalks and roads, creating a diverse dune scape, distinctly different from the one created under natural conditions. In our case, the major drawback is that the human intervention on the sand dunes of Goa has never been quantified. This exercise requires immediate attention.

Since sand dunes are eolian bedforms which are dynamic and mobile, they should be allowed and be able to evolve freely and naturally in form and space. Research has shown that dunes in certain areas have displaced and migrated naturally by tens of meters towards the sea as well as away from it as compared to their primitive location. Since a natural sand dune is in a natural equilibrium with the beach, if the beach retreats the dune should be able to do likewise (retreat), so as to assure its role as a sand reservoir in order to maintain the equilibrium between the dune-beach ecosystem. Since a majority of beaches are in a process of retreating due to a slow rise in sea levels, the dunes should also retreat landward by rolling on themselves. Such a mobility and flexibility of sand dunes are rarely considered. For this, ample space is necessary to be reserved for migration, and sand dunes should be at liberty to do so. That was precisely the reason why our ancestors always built houses and roads away from beaches and always lived behind sand dunes, a system that can still be observed along the entire west coast of India. A perfect coastal equilibrium was thus maintained.

Erosion of beaches and dunes has been observed at several places along the open sea front and within estuaries. This phenomenon, although localised, is

Arambol (Pernem) Beach Section



significant at Arambol, Anjuna, Majorda and Colva. A proper scientific proof pending, these events may be attributed to annual changes that a beach undergoes. The area at Colva, for example, regenerates itself during the post monsoon period as has been observed over the last few years. Sea erosion is however most pronounced at Anjuna (main point) where a high hill is in the process of collapsing every year and has created a high vertical scarp; its base has receded by more than 107 m in the recent past. At Velsao and Agonda, coastal erosion is evidenced by a large number of tall uprooted trees. At Agonda, the sea has often risen beyond normal levels and emptied into the creek which runs parallel to the coast. Marine gravels thrown beyond the high water mark indicate intense wave energy accompanied by heavy erosive tendency.



Sand dunes on Candolim beach

Near Verem in the Mandovi estuary, the existing small sandy beaches are gradually disappearing. This is attributed to a series of walls erected recently, mostly by hotels. Such structures increase the turbulence of waves resulting in the removal of sand. Similarly at Palolem, many hard structures have been built along the beach. This human intervention has resulted in shoreline changes, wherein the sea is advancing landward as observed over the last two years. A remarkable erosive activity is proved by breaches in concrete embankments as well as uprooted trees along the high tide line. Marks left on these walls show a lowering of the level of the beach indicating that a large volume of sand has been washed away. The erosive activity at Palolem, attributed to human action, is definitely and undoubtedly irreversible.

The most alarming erosive processes are seen along the Miramar-Campal sector. The entire stretch which constituted a dune belt with a thick vegetal cover as late as the 1950s has now ceased to perform the functions of a beach dune ecosystem. It has been postulated that when the capital city of Panjim came into being during the earlier part of the century, sand was being mined from the Campal dune and used for the constructions. This led to the depletion of sand resulting into a negative sand budget. As the system could no longer sustain due to sand starvation, erosion set in. A long stone wall was then erected in 1958 as a defence mechanism. Here, the planners got the taste of their own medicine; most of the wall collapsed and erosion continued unabated. Another stone/boulder embankment was erected during the last decade and can be seen at Campal. Erosion continues

with full vigour as hardly any sand can be seen along this structure. The lighthouse which was once on the shore is now found in water, and is hence under threat as it faces an imminent collapse.

Despite the fact that the shoreline is prone to erosion, a huge hotel complex is now under construction on a dune at Miramar, precisely at a place where it should not have been. A concrete wall built in 1996, about four meters landward of the earlier (1958) wall, is already showing signs of decay with breaches at many places. The narrow beach in front is slowly disappearing as the entire area gets submerged during regular high tide. Therefore, this concrete wall which was erected in the intertidal zone is not only a blatant violation of CRZ regulations but can also be termed as a monumental human blunder.

Sand eroded from a particular site has to be deposited elsewhere. We have identified various sand bars/spits at river mouths as in Talpona, accretion of beaches as in Miramar, and also islands, shoals (and mud flats) within all the seven rivers of Goa. A jetty/ramp at the mouth of river Tiracol has been rolled over and engulfed by sand deposits; a new ramp had to be built for ferry users.

It is extremely doubtful whether the countless dunes which have disappeared from all over the coast can ever be restored; this is because we have lost track of such losses. Nevertheless, before the dune-lined shore turns into a concrete coast, it is imperative that further losses be curtailed and the existing dunes be conserved at all costs.

Antonio Mascarenhas

Calangute (Bardez) Beach Section



THE PROBLEM OF SAND EXTRACTION

Need, greed and human illusions have ganged up together to make a graveyard of the dunes. The history of what has come to be known as sand mining is a classic case of how government, industrialists, businessmen and the courts recklessly destroyed a major ecological endowment.

First, people have not been able to resist the plunder of sand for mixing with cement for construction purposes. Second, industrialists have looked upon the dunes as a major source of industrial raw material. Third, the new five-star resorts are almost all constructed on the graveyards of the dunes.

Construction-related use — The basic problem of erosion due to sand extraction began almost 70 years ago. In Caranzalem where the dunes are missing, heavy erosion started around 1928, and a shore width of 65 metres appears to have been lost, including some houses and what was known as Bishop's House. Ruins are seen at low tide. The erosion was arrested after a concrete wall was built along the sea shore in 1958. The construction of this wall took a few years and cost the public exchequer several lakhs of rupees.

There is little doubt that the erosion initially began with the extraction of sand from the dunes, possibly for the construction of houses in Panjim and Campal. At Adarsh Colony, where both the dunes are fortunately still existing, there is no erosion, but this may be a temporary respite. At Miramar beach, near the Youth Hostel, the shore has become unstable because of reckless extraction by the building lobby. Despite high paid Collectors and other government officials, cart loads of sand are still looted every night from the beaches of Goa for the construction industry.

Industrial demand — Besides construction, the major plunder of sand has been for industrial purposes. Tonnes of sand from Goa have been extracted for foundries in the Mumbai-Pune-Chinchwad belt. Fine sand is used as a catalyst in producing iron casts, as mixing in sand helps faster heating and quicker melting of iron. Sand is also used in glass foundries and brick making units. For some time now, extraction of beach sand for these purposes has been completely stopped.

Five-star hotels — Most of the hotels constructed before implementation of the ban on construction upto 500 metres from the HTL have been constructed after razing the sand dunes existing on the land. Most of the other hotels as well have treated the sand dunes with utter callousness and removed them, often with a view to provide easy access to the beach, or even for the sake of providing tourists with a better view!

The genesis of the problem — According to the late Walfrido Antao from Arossim, who was long associated with the struggle to end sand mining for industrial purposes, during the Portuguese rule, the removal of sand or any part of the earth was not allowed without the permission of the mamlatdar—



Trucks excavate sand dunes for construction of Ramada Renaissance

then known as the Administrador—and for that too, necessary approval from the Captain of Ports was required. At that time the Goan beaches were absolutely virgin.

After the liberation of Goa, the extraction of sand through what are called mining leases became possible as a consequence of political turmoil. Losing the support of some of his own M G Party members, Chief Minister Dayanand Bandodkar sought the support of the United Goan Party members. As a reward for their support, UG politicians demanded sand extraction mining leases. With unusual alacrity, the necessary recommendations were made by the Goa Government to the Central Government under the Mines and Minerals (Regulation and Development) Act, and several leases were soon granted by Mr. Bandodkar to his new supporters. Soon thereafter, Mr. Bandodkar died. His daughter Shashikala Kakodkar became Chief Minister. She continued the granting of leases.

Altogether 16 leases were granted, some for 10 years and some for 20 years. Most of these were in South Goa—along the coast of Arossim, Benaulim, Varca, Cavelossim and Mobor. In North Goa, leases were granted in Candolim, Baga and Anjuna. But these did not last long.

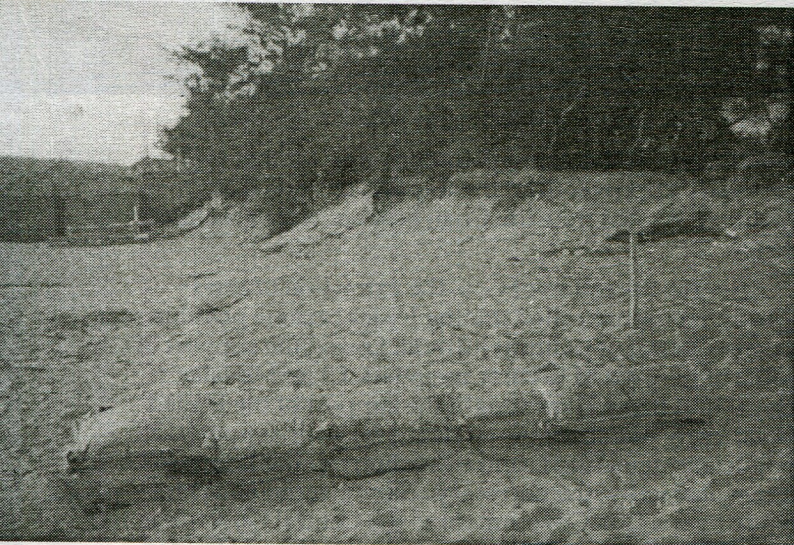
Anti-Sand Extraction Committee — As a result of the leases, thousands of tonnes of sand were extracted by the lease owners. Sand dunes and vegetation along the coast were destroyed. Thousands of coconut and cashew trees belonging to the people were uprooted in the process. Saline water entered the paddy fields and destroyed crops. Soon, neighbouring villages began to face the ill-effects of this devastation of a delicately balanced natural system. These immediate effects of sand extraction, which caused tremendous losses to the people, led them to oppose and fight the menace. At first, individual representations were made to the Government, but the Government showed no interest.

Palolem (Canacona) Beach Section



It was only in the late 70s, when an Anti-Sand Extraction Committee was formed, that the real struggle began. Its secretary, Francis Rodrigues, brought the problems faced by the people and the ecological degradation bound to arise in the near future to the notice of all possible Government authorities. The issue was also put before Eduardo Faleiro, then Member of Parliament, who took it before the then PM, the late Mrs. Indira Gandhi.

In reply to a letter from Mr. Rodrigues, Francisco Monte Cruz, the then Congress candidate from Benaulim, said that he was 'perfectly aware of the dangers posed to the residents of Cavelossim, Varca, Carmona and Benaulim, since sand dunes form a natural protection to vegetation as well as the inhabitants, and once this sand is extracted in huge quantities, the whole area will invite



Sand dunes hacked by shack owners on Calangute beach

sea erosion and thereby face serious dangers and the government would have to spend crores of rupees to build retaining walls.' He further said that he was also aware of the illegal sand extraction carried out and promised to take severe action once elected MLA.

Of course, he got his post as MLA of Benaulim. But he predictably failed to keep the promises he had made.

A press note in the (now defunct) *West Coast Times* dated 18/12/80 said that when (former) Chief Minister Pratapsing Rane visited Benaulim constituency, he was taken to all the beaches of the south coast from Arossim to Mobor and the rape of the beaches caused by sand extraction was shown to him. A memorandum in this regard was handed over to him. On the spot, the Chief Minister gave orders to his officials to ban sand extraction. But he took no further action.

Realising that the Government had taken no action inspite of bringing to its notice the havoc created, the people organised mass agitations to stop the extraction. The agitation took the form of hunger strikes and morchas. The Anti-Sand Extraction Committee did a creditable job in studying the problem, documenting its various aspects and even presenting scientific reports to the

Government; these purported to show that sand extraction was pitted against local agriculture, and destabilised local ecology.

The Government remained unconcerned about the protest for two reasons. It defended the sand extraction on the basis of advice given by the then Asst. Director of the Geological Survey of India, Hyderabad, Mr. C. Ramaswamy. This worthy had passed an opinion that small quantities of sand (upto 3000 tonnes per annum) would not affect the coastal ecology. (The extraction levels eventually turned out to be very much higher than that modest figure, averaging in fact 45,000 tonnes per annum!)

The second reason is that the government thought that the coastal areas could be 'developed' if the 'useless dunes' could be levelled and the area planted to coconut plantations. Sand extractors mentioned this in their plaint against the cancellation of their leases, quoting a Central Government document, which stated:

'The State Government has, however, agreed that removal of dunes and levelling of sand will give better coconut plantation in the area.'

Asked in the Assembly whether the 'Government is aware that the removal of sand is not only injurious to the life and property (including agricultural land) of the residents of the areas, but also it is an erosion of shore land,' the then Chief Minister replied: 'Removal of the sand is done only from the sand dunes. There will be no erosion of shore sand because within 80 metres of the shore, the extraction is not permitted.'

The protests of Salcete villagers, however, seem to have finally achieved their objective, and fairly soon a chorus of scientific opinion began to be expressed against sand extraction and disruption of dune ecology. It was this swing in opinion that compelled the Government to finally take some serious interest in the issue.

Almost the first to raise its voice was the Town and Country Planning Department which protested the extraction policy as early as 1975 at one of its meetings. At the 10th meeting of the State Programme Board, held on March 8, 1979 Dr. R N Prasad of the Geological Survey of India made a strong plea to have the leases cancelled, and the meeting decided to ask the Geological Survey for a detailed opinion. On September 9, 1979, that opinion arrived, and it too unambiguously recommended that the leases be cancelled.

Later, Dr. R Sengupta, Chief of the NIO's Pollution Cell, also wrote an opinion along the same lines. And so did the Eco-Development Task Force. So it seemed the time had come to cancel the leases after all.

Once that decision was made, of course, the Government had to demonstrate that it had really been concerned about the ecology all along and hope that the public would forget the past bureaucratic and political record that had led to the present ecological onslaught. It had now to find adequate justification for cancelling the leases.

Benaulim (Salcete) Beach Section





Sand dunes raped on Varca beach

It then marshalled all the scientific opinion, and recommended the case for cancellation to the Central Government, which made its own study of the matter. The Central Government then passed a directive to the State Government, asking that the leases be cancelled under Section 4A of the Mines and Minerals (Regulation and Development) Act, 1957, and to have these now

given to the public sector Economic Development Corporation. It was presumed that once these leases passed over into the hands of the EDC, sand extraction would automatically cease.

But another arm of the government, the High Court of Bombay (Goa Bench) set out to undo what the executive and legislature had elected to do. The Court stayed the proceedings and the sand extraction continued. It would be several years before the Court itself would recognize its error and pass a final judgement upholding the cancellation of all the sand mining leases. By that time, much damage was already done.

The CRZ Regulation of 1991 listed levelling of sand, altering the dunes and making material changes in the landscape as prohibited activities. The B.B. Vohra Committee, appointed by the Environment Ministry in 1993, under pressure from tourism developers, to relax the environmental guidelines concerning development on the beaches, went to the extent of recommending that resort developers should be allowed to level the sand dunes in the 200 metre zone of their plots. B.B. Vohra was an environmentalist. Fortunately, the MoEF did not accept all the recommendations in Vohra's report and the dunes escaped the death sentence at least on paper. Sand dunes were finally declared CRZ-I areas in the approved Goa CZMP and dune areas were specifically designated in several villages.

Marine Pollution

Goa's coastline lies off the oil tanker route from the Gulf ports to the Far East and Japan. Every year, millions of tonnes of oil and its products are transported along this route. Ships sailing along this route discharge their oily ballasts and bilge washings. After evaporation of the lighter frac-

tions of oil and photooxidation, the heavier fractions gradually form into tar balls. Driven by winds and currents these tar balls are deposited on the beaches. Periodic tar balls and raw oil pollution is observed on all the major beaches, mostly during the onset of monsoon (tar balls)

and sometimes throughout the year (raw oil cakes).

The life of the tar balls out on sea varies from 38-58 days, while on the beach it is not yet known. However, due to the half yearly change in surface circulation, these tar balls are deposited along the beaches of the west coast of India, including Goa.

However, the pollution incidences involving raw oil 'cakes/debris' occurring on and off along the entire coastline is mostly attributable to possible cases of clandestine or accidental dumping of oil by 'ships/boats/trawlers' anchored in the Port areas or plying in territorial waters close to the coastline. This possibility has been brought to the notice of the Coast Guard and the MPT. Such incidents can only be controlled by frequent patrolling and by taking stringent action against the offenders.

Estimates from two years' data gave a figure of 40 tonnes as the yearly deposition of tar balls on the beaches along the coast of Goa.

R. Sen Gupta, S.Y. Singbal, S.N. de Souza, Present Status of Environment Pollution and around Goa, NIO, Dona Paula, Goa.

Pollution along the coast from oily wastes discharged illegally by ships



Saving Miramar Beach

Efforts of private resort developers and businesses to misappropriate or takeover public beaches have been increasing in recent years, and the Government has often tried to aid and abet such designs. The Taj Holiday Village tried these tactics during the CHOGM Retreat, and failed. For some time after that too their security guards attempted to dissuade people from using the beach in front of the hotel so that it could be used exclusively for their guests. But these efforts also failed.

The Goa Government acquired a private property next to the Cidade de Goa under the Land Acquisition Act 'for public purpose' and handed it over to the hotel management to enable it to effectively privatise Vainguinim beach, cutting off public access to the beach. The hotel itself is on record as claiming that the purpose was public because the hotel (a five-star resort) is open to the public. Access was restored only after the Goa Foundation successfully moved a petition before the High Court.

The most egregious effort, and an official one at that, was the recent attempt to privatise the splendid Miramar beach. The whole exercise was sought to be cloaked in euphemisms, because the concept of privatisation of public commons, especially a popular beach like Miramar, is bound to raise the hackles of every public-spirited individual and group. The Chief Minister claimed, without much conviction, that the Government's proposal largely involved privatisation of services for people visiting the beach, and not privatisation of the beach itself.

The actual beach management plan drawn up (and even displayed on the Internet) indicated, however, that the service providers were actually going to occupy considerable physical area of the beach in order to provide those services. Since many of the services offered would have a price-tag, this could only mean that citizens would

henceforth have to pay for frequenting the beach. The apprehension among the public was that private entrepreneurs with good relations with the powers-that-be would thus get hold of the beach, convert the beach commons into a money-spinning exercise, and the upshot of it all would be that the public at large would be excluded from the beach.

The Government was at pains to hide the real reason behind the exercise, and various government officials including the CM could be heard waxing eloquent about the filthy and disgusting state of our beaches, and how only an initiative like this could provide a solution.

The beach management proposal excited a storm of protest from every corner of Goan society, and the Government was put on the backfoot. In an attempt to mitigate the protest, the Chief Minister appointed Dr. Nandkumar Kamat as a one-man commission to examine the whole matter. What this was expected to achieve was a mystery, given that the whole exercise was *prima facie* illegal under CRZ regulations. A thumbs-up from a commission could hardly render it legal! In any event, why was this particular proposal not put up before the Goa Coastal Zone Management Authority mandated by the apex court itself to look into such matters?

The One Man Commission initiated its work in December 2001. Two days were set aside for public hearings. 47 written submissions were received, 39 members of the public were heard.

The 300-page report submitted in February 2002 is aptly titled 'Castles in the Sand'. The Commissioner has taken into account the strong views expressed by the public on the subject, the deficiencies in the government plan and the ground truth. The area dealt with goes beyond the 1.7 km Miramar beach stretch, on the grounds that other areas forming a part of its watershed are intrinsically linked with this stretch.

Some of the important points made by the Commission are listed below:

1. People consider Miramar to be a unique beach, so far left alone as a public asset. They are vehemently opposed to any regulation or restriction on beach access.
2. There is no support for the single service provider concept as people are suspicious of the monopoly nature and profit motive behind such a proposal.
3. There are powerful ecological and environmental concerns which go against this proposal.
4. The local fisher-folk need the waterfront for their livelihood and view proposals for developmental activity with anxiety.
5. There is strong objection to any interference with the existing dune system.
6. The role of the government is considered important in managing the beach. Improved co-ordination between various government authorities is required.
7. Since the fragile Miramar beach ecosystem is already under stress, a comprehensive environmental impact assessment is required prior to any planning, for the entire area estuarine area from Divar to Cabo.

After a study of the proposal, the commission reached the firm conclusion that the approach displayed in the proposal was largely based on technical, engineering and financial aspects, and a study conducted over a mere few months. 'Miramar Beach has evolved over the past at least hundred millennia and has been studied by NIO scientists from 1973 onwards. Any plan based on a rapid, five-month study with a techno-financial and engineering focus for a fragile beach ecosystem has built-in risks and hazards.'

The Commission 'emphatically recommended the rejection' of the Miramar Beach Management Plan (MBMP), stating that there were 'fundamental flaws in the process leading to it and in the plan itself'.

For now at least, one more attempt to expropriate a public commons has been defeated. The credit for this goes to the public and to the NGOs, which rose as one against the proposal and submitted detailed objections. Credit must also go to Dr. Nandkumar Kamat, who rose to the occasion and fearlessly expressed his findings. And let's not forget the Chief Minister, Manohar Parrikar, who agreed to submit to public and scientific opinion, when he found that it was solidly against the project.

The popular Miramar beach: saved in the nick of time



Harvey D'Souza

SALINE INTRUSION IN COASTAL AREAS

A major environmental disaster looming on the horizon in Goa is the spectre of saline water intrusion into the coastal areas and the destruction of sweet water aquifers.

In different parts of the country, particularly areas like coastal Gujarat, due to careless tapping of groundwater, salt water has entered in some areas upto a distance of two to three kilometres inland, destroying most of the drinking water sources. Though the Government of Goa is aware that this scenario could well be repeated in the Goa, it is actively promoting a major programme of groundwater exploitation. Much of it is related to the luxury tourism industry and to the setting up of aquaculture farms.

Groundwater surveys have been carried out by the Central Groundwater Board in 1976 and later by the Groundwater Cell of the Government of Goa. A detailed survey was made of open wells in the 500 m zone and water samples were also collected from numerous locations for chemical analysis, on the basis of which the Government of Goa has prepared a report on the aquifers occurring in coastal strips, upto a maximum distance of two kilometres from the coast. The main objective of the study was to optimise groundwater exploitation in the area yet avoid the possible threat of salt water intrusion.

A major portion of the groundwater recharge is due to the monsoons and the aquifers are supplemented by migration of water from higher areas during dry periods. As is well known, sweet water being lighter, it floats over the salt water in the region of intermixture of the two regimes. For many years no problem of saline intrusion had occurred, since most of the wells were used for domestic purposes and the water was largely hand drawn. In recent years, however, a major problem has begun to emerge precisely in these areas where sustained use of groundwater is being carried out, most notably by the five-star hotels.

The case of the Leela Beach is revealing, to take just one example. Despite a clear condition being imposed on the hotel by the Environment Ministry that no water would be tapped within 500 m from the HTL, the resort went ahead and installed several bore wells in the zone. These were shut only after the Goa Foundation filed a Writ Petition in the High Court. The Government of Goa openly colluded with the hotel's activity.

The Status Report and Environmental Management Plan for Coastal Area of Goa prepared by the Town and Country Planning Department in 1991 stipulates that in the entire Mobor peninsular only open wells would be permitted, and that too, with just a depth of five metres. Despite this, the Leela Beach Resort continued with its bore wells in the small area left outside the 500 m zone. By 1992 most of the wells on the Mobor peninsular had turned saline and the Leela Beach which had excavated a huge area for a sweet water lagoon was now compelled to convert it into a salt water lagoon instead.

In another instance, in late 1992, the Goa Foundation had to get court orders to shut down wells put up by the Hospitality (now Kenilworth's) Resort in the 500 m zone.

These are merely a few instances of the 'strict' monitoring of coastal groundwater exploitation carried out by the government authorities. As more and more resorts come up with their attendant golf courses, and as new aquaculture farms begin operations, the pressure on the groundwater aquifers is bound to go beyond reasonable bounds. By the time this happens, it will surely be too late to reverse the developments, since no area in the world which has fallen prey to saline intrusion can provide any history of having successfully reversed the process.

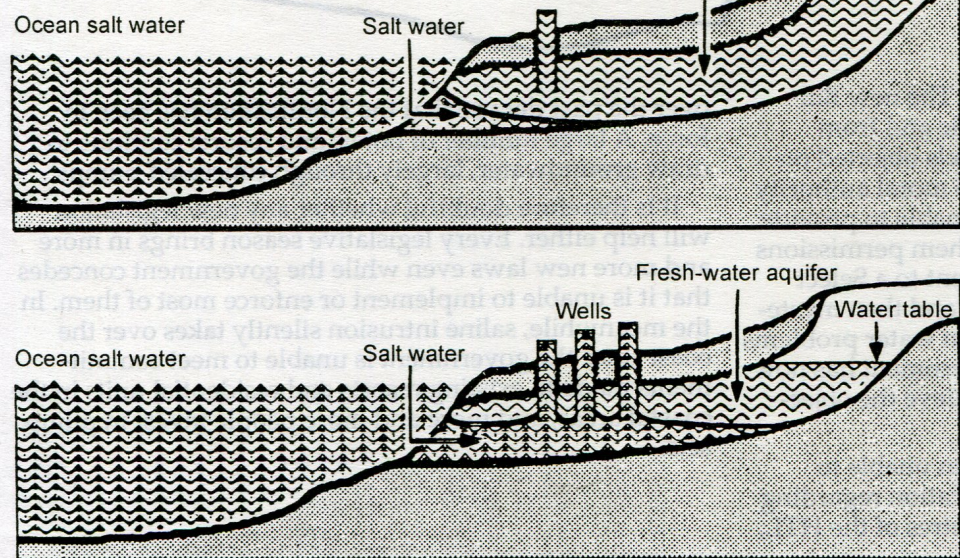
The Taj Resort and saline water intrusion — The excessive demands on groundwater by the tourism industry have created all kinds of problems along the coastal strip. A public resource is not only being systematically cornered by a powerful few, but major adverse effects in terms of salinisation and deterioration of water quality are experienced in wells around tourist resorts.

A 1994 study conducted by Glenn Kalavampara under the guidance of Dr. A.G. Chachadi of the Department of Geology, Goa University, indicates how excessive drawing of groundwater by the tourism industry has affected the groundwater regime and led to a drop in the water table with consequent intrusion of saline water into the other wells in the area. Titled 'Preliminary Assessment of Salt Water—Fresh Water Interface Between Fort Aguada and Candolim Coast, North Goa', the study focused on a region of the coast where the Taj resort has been engaging in large-scale extraction of groundwater to augment the availability of water it receives from the PWD.

The study clearly indicates that the Taj group is responsible for saline water intrusion into wells in the area as well as other types of damage to the groundwater regime. The variation of water levels in the study area

How saline intrusion occurs

Salt intrusion occurs when



is generally gentle except in the southern part where the Taj establishment exists. The steep gradients at this particular area are very likely due to excessive withdrawal of groundwater by this establishment. In the post-monsoon period as well, though the water levels are less than six metres from the surface in most of the area, the area around the Taj still shows comparatively deeper water level for this very reason. In the pre-monsoon period, total dissolved solids in the groundwater troughs which form around the Taj exceed 1000 ppm, indicating a high degree of salinisation of water. As the accompanying map shows, the flow of groundwater is towards the sea, except in the Fort Aguada area (where the Taj establishment exists). Here the flow is directed inland, as sea water intrudes due to the troughs created by excessive withdrawal of groundwater.

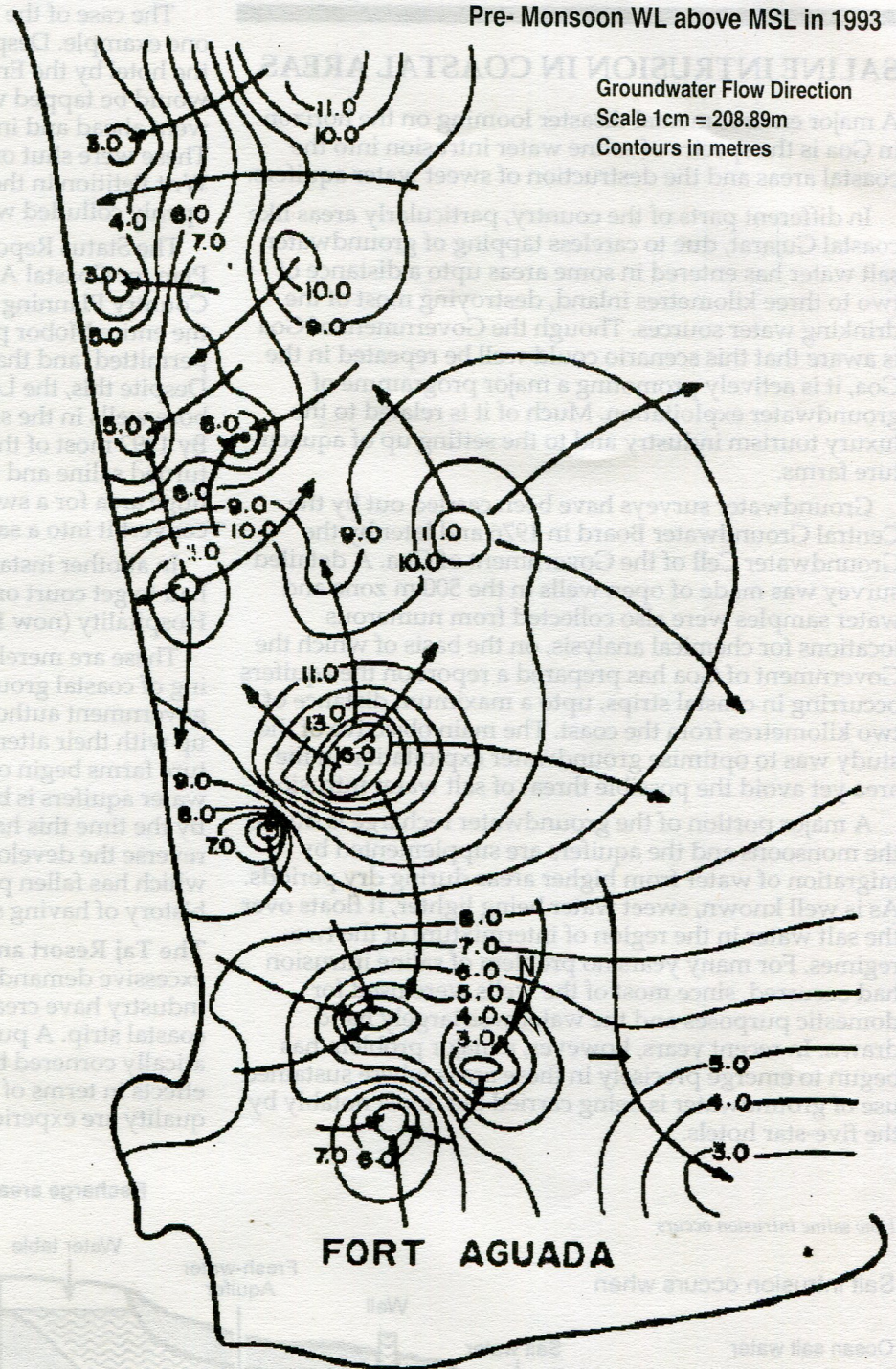
Saline intrusion is not the only problem caused by the Taj. There have been tremendous increases in water demand due to tourism development and there has been a steep increase in municipal water supply usage. This increase leads to a proportionate rise in the amount of sewage water which joins the groundwater regime leading to a deterioration in the water quality.

The study recommends that the groundwater exploitation system should be rationalised with the borewells being shifted further away from the coast. Also, the pattern of pumping from these borewells should be controlled. This would help to solve the problems caused by excessive exploitation of groundwater.

In 2001, the Goa Government finally introduced a new Bill to control the extraction of groundwater, especially in coastal areas. All coastal villages have been included within the purview of the proposed legislation. The new Bill provoked severe criticism from the public and from affected lobbies. Both industries and hotels objected on the grounds that the government had no moral authority to bring in such a bill so long as it was unable to provide them with adequate water after giving them permissions to set up their businesses. The bill was sent to a Select Committee which listened to objections, and then mysteriously deleted any controls envisaged on water problems caused by the mining industry. The government has now promised to bring in an ordinance to achieve the objectives of the Bill.

Till date, the Goa Government has been unable to enforce the provisions of the CRZ Notification regarding extraction of groundwater within 500 metres of the HTL,

Pre-Monsoon WL above MSL in 1993



over the past decade that the Notification has been in force. A large number of hotels and resorts continue to draw groundwater, largely through concealed pumps.

It is therefore doubtful whether any new legislation will help either. Every legislative season brings in more and more new laws even while the government concedes that it is unable to implement or enforce most of them. In the meanwhile, saline intrusion silently takes over the coast since the government is unable to meet commitments made to existing resorts and residential units in the coastal areas, and more and more people invest in pump sets.

THE RETURN OF THE OLDEST TOURIST: THE OLIVE RIDLEY TURTLE

In the midst of a generally depressing environmental scenario, there are some elements of cheer. One of these is the turtle conservation programme at Morgim beach in North Goa.

Marine turtles visit some Goan beaches during the months of October to March to lay their eggs. But they face a serious problem of human longing for their eggs. News of turtle arrivals spreads like wildfire in the villages and there are streams of villagers coming down in search of eggs. It is reported that strict rules govern the hunting of the eggs. Exclusive discovery means exclusive ownership of all the eggs in a nest. If two people sight a nest together, the eggs are to be divided equally between them, and so on. Scarcely any baby turtles are born and get into the sea.

The turtles visiting Goa are the famous Olive Ridley sea turtles (*Lepidochelys olivacea*). This turtle is found in the Gulf of Kutch, the coastal waters of Kerala, Tamil Nadu, Orissa and the Andamans. Goa is towards the northern extremity of their range and, though found in the Arabian Sea, their real concentration is in the Bay of Bengal. The Olive Ridley has a broad, heart-shaped carapace with a flat top. The adults are olive-green in colour, while the young ones are greyish-black. They feed on fish, snails, crabs, jellyfish, lobsters, oysters, echinoderms etc. They prefer mainland beaches for nesting.

One of the residents of Morgim, Capt Gerald Fernandes, had observed in 1995 that a number of Olive Ridley turtles were coming in to nest on the Morgim beach and that their nests were being plundered of eggs by the locals. Concerned, he wrote to the WWF-Goa and the Forest Department, asking them to act to protect this endangered species. Rewarded only with silence, he approached the Goa Foundation and suggested taking immediate action. Faced with a concerted demand by environmentalists in Goa, the Forest Department finally swung into action.

Fortunately, Morgim is a relatively isolated and unfrequented beach. One of the most heartening features is the active cooperation of the villagers after initial suspicion and reluctance.

The turtle protection programme began in 1996, when the Goa Foundation and the Forest Department staff of Pernem began routine patrolling of Morgim beach. Patrolling commenced in September 1996. No turtle was seen that season, but the patrols encountered several turtle nests that had already been plundered by some local villagers. (Turtle eggs are sold in the market for as little as Rs 2 per piece).

It is not that the villagers were unconcerned about the welfare of the turtles, but in a scenario where natural resources are seen as free goods to be plundered by the first comer, they wanted a slice of the pie as well. Discussions with the villagers soon convinced them of the need to protect the turtles and they became enthusiastic participants in the programme.

The Forest Department took up better coordination of the effort including drafting of personnel from among the

local people in the season of 1997. The effort struck pay dirt. That year at least three turtles laid eggs on the beach and the youth of the village and the department literally burnt the midnight oil in their efforts to protect them. Villagers, concerned NGOs and Department staff led by Forest Officer S.S. Fadte actually set up tents and lived on the beach, next to the turtle nests, till the turtles hatched. These hatchlings were then caught and released into the sea. This ensured that many baby turtles that would have otherwise died while making their way into the sea would now survive. As a result, more than 400 baby turtles were released that year itself into the sea. The numbers have been steadily increasing as attested by the table below. Evidently, the buzz among the turtles is that Morgim is a good place to nest. And when the turtles hatched on Morgim begin to nest in their turn, they are likely to come to Morgim, as turtles have a strong homing instinct and travel thousands of kilometres to nest at the site of their birth.

The project has been going on for five years now and with the passage of some years, one may see the turtle hatcheries reestablished in their earlier glory.

The Department is clearly elated with its efforts and is now planning to set up a turtle hatchery on the Morgim beach. A Turtle Study Centre is being set up in a spare building at the Range Forest Officer's premises at Pernem. The Department is also planning to recruit staff on other beaches, particularly Galgibaga, for the purpose

Turtle coming to nest at Morgim beach under the watchful gaze of volunteers



of protecting more turtle nesting sites. In the Coastal Zone Management Plan, the Goa Government did not specify the existence of any wild life habitat on Goan beaches. This was only pointed out in a representation to the Ministry of Environment and Forests by the Goa Foundation. Eventually, when approving the Management Plan, the Central Government declared both Morgim and Mandrem in North Goa as CRZ-I areas because of reported turtle nesting on these beaches, based on the recommendations of the Goa Foundation. These areas are now protected with a no-development zone upto 500 metres from the HTL.

Unfortunately, marine turtles continued to be killed in other parts of Goa. Three turtles were reported slaugh-

tered at Benaolim and another two at Galgibaga beach during the 1998-99 season. This is despite the fact that turtles are worshipped among some of the Hindu communities. (See the 'Tailpiece' at the end of chapter 6.) So some measure of protection ought to be ensured. Unfortunately, there is a small section of the population which believes turtle eggs are best poached and turtles better off eaten than alive.

At Galgibaga beach, though, the Forest Department has started another project from the year 1999-2000. In Galgibaga the project was started by a visit from local environmental groups, Southern Bird Wing and Green Cross, who promote important environmental causes via talks and interactive wildlife displays. The local priest and schoolteacher from the area are now coordinating the efforts on the beach, and continuing to raise awareness. The turtles have not only provided a communal project for the villages but are also providing employment. Success is dependent on the support of these people. Education is helping them to become aware of the issues and increases motivation to care for this species.

The Forest Department has 2 wardens constantly patrolling Morgim beach, for which they are paid Rs 56 a day. Due to financial constraints, wardens are not available on a full time basis for Galgibaga beach, but manpower is utilised from the nearby Cotigao Wildlife Sanctuary. Alongside the full time wardens there are many local volunteers.

Recently, Capt Gerald Fernandes and other villagers were honoured by the Forest Department for their role in mobilising support for the turtle conservation drives.

Morgim and Galgibaga are isolated beaches, relatively unaffected by the influx of tourists into Goa and the attendant developments. If only proper protection could be provided at other beaches as well, the whole coastal strip of Goa could become a haven for the nesting of

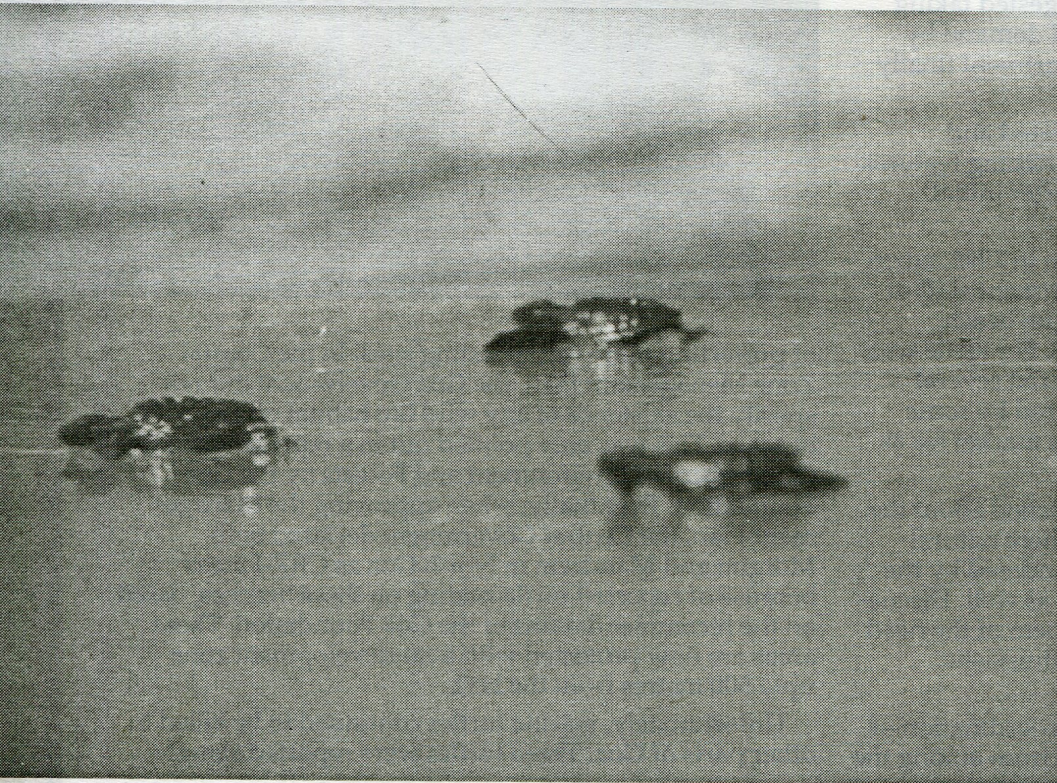
Olive Ridleys. After the protection of these beaches the number of turtle nesting sites has shown a dramatic increase. In 2000-2001, turtles came to nest in substantial numbers on Agonda beach as well; hearteningly, there was even one turtle nesting at Kerim. The number of turtles nesting at Galgibaga beach has now exceeded the number of sites at Morgim beach in the 2000-2001 breeding season. The success of the programme can be gauged from the fact that the total number of turtles nesting Morgim, Galgibaga and Agonda were 31, 33 and 9 respectively. The coming seasons should see a further increase. In the first year of the programme, 1997-98, just five turtles nested on Morgim beach. Just four years of protection has brought about this transformation. Obviously, word is spreading within the turtle community!

The Goa Coastal Zone Management authority is now considering a proposal from the Goa Foundation for declaring the Galgibaga beach as a CRZ-I area in the CZMP. The Agonda beach has already been classified as CRZ-I due to the presence of extensive mangroves in the water bodies that run parallel to the beach.

The protection of the turtle nesting sites has generated active interest in tourists visiting the area and led to improved business for local restaurants and shacks. New problems have developed as a result of these intrusions. Those in charge of the nests now routinely pick up the baby turtles as they hatch and put them in buckets for the tourists to see.

By the time the baby turtles are released, they are already quite exhausted. This is because by instinct they will struggle to get to the sea, but are unable to do anything but flap about within the confines of the bucket. Wild life observers doubt that many of them will survive since in such a condition as they would find it difficult to escape predators. The Forest Department has been informed of these undesirable activities and we hope that they will not be repeated. Best for the turtles to come out on their own and proceed immediately to the sea. If the tourists miss the sight, it's their problem. To restrain the babies from going to the sea just to accommodate the tourists is a fatal abomination.

Olive Ridley hatchlings entering the sea for the first time



Harvey D'Souza

Statistics on hatchlings released.

Breeding Season	Beach Name	No. of hatchlings
1997-1998	Morgim	456
1998-1999	Morgim	262
1999-2000	Morgim	759
"	Galgibaga	283
2000-2001	Morgim	2492
"	Galgibaga	2567
"	Agonda	715
"	Querim	114

THE CONSERVATION OF BEACHES

India's awareness that its beaches constitute a fragile ecosystem goes back to the '60s. Institutions like the National Institute of Oceanography at Goa and others had played a significant role in studying the interaction between the forces of sea and land. An invaluable body of material and data had been generated as a consequence.

Central Government's Initiative — In the meanwhile, however, the protection of beaches became government policy only after the late Mrs. Indira Gandhi dispatched her now famous directive to the Chief Ministers of all coastal states in the Union. In her letter dated November 27, 1981, she observed: 'I have received a number of reports about the degradation and misutilisation of beaches in our coastal states by building and other activity. This is very worrying as the beaches have aesthetic and environmental value as well as other uses. They have to be kept clear of all activities at least upto 500 metres from the water at the maximum high tide. If the area is vulnerable to erosion, suitable trees and plants have to be planted on the beach sands without marring their beauty.'

'Beaches must be kept free from all kinds of artificial development. Pollution from industrial and town wastes must be also avoided totally. Please give thought to this matter and ensure that our lovely coastline and its beaches remain unsullied.'

Thus, in 1981, the 500 metre ban on construction began to operate in principle all over the country.

The Department of Environment set up a working group on September 1, 1982, to work out environmental guidelines for development of beaches and the group submitted its report a few months thereafter. The guidelines were published by the Department in booklet form in July 1983.

In any event, after 1981 at least, the guardianship of the beaches is supposed to have passed over into the hands of the Department of Environment, and later, the Ministry of Environment & Forests (MoEF). But the small department was unable in any realistic sense to either keep track or be informed of what was taking place all over the country's beaches. But it stubbornly resisted efforts to relax the 500 m no-construction policy.

Thus, the department's annual report for 1984-85 explicitly states: 'The department has received several proposals for relaxation of the (PM's 500 metre) directive. Those concerned have been advised to abide by the directive and come up with detailed justification for such cases where relaxation is sought.'

In November 1985, a note was issued from the Prime Minister's office relaxing the ban on construction on beaches, from 500 to 200 m from the HTL. This was done only for beach resorts. The Tourism Ministry's pressure had finally paid off. To approve such beach resorts (and just as the Goa Government had set up the EDC), the Tourism Ministry set up in June 1986 an Inter-Ministerial Committee (IMC). The IMC, which was basically stacked with tourism department officials also had one representative from the MoEF. The Tourism Department officials were basically concerned with meeting hotel room

targets, and found the environmental demands of the MoEF restrictive and even unreasonable.

Conflicts speedily arose between the lone member of the Environment Ministry and the other members of the IMC. The conflict was basically over adequate Environment Impact Assessment (EIA) studies of each of the beach resorts concerned on the coastal ecology. As recorded above, the MoEF felt that the EIA data was simply inadequate.

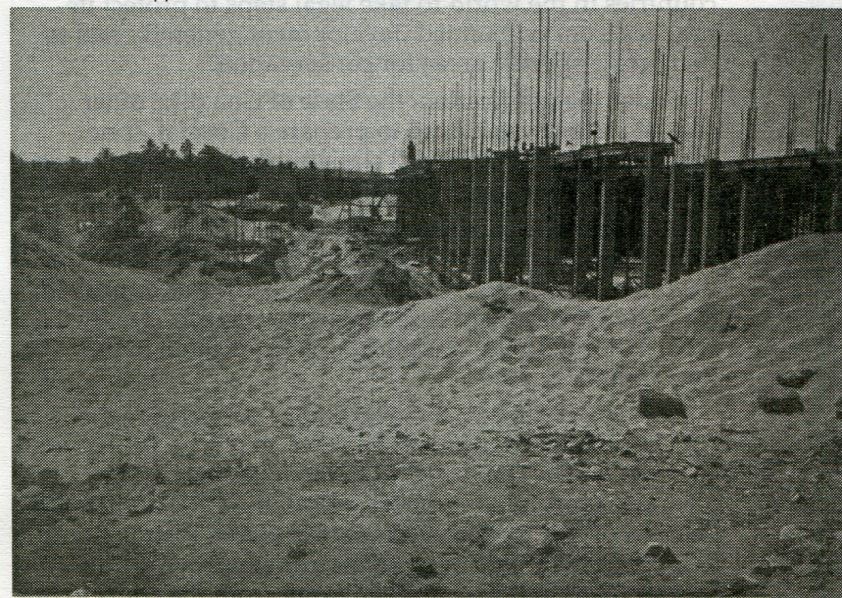
The minutes of the IMC meeting of August 19, 1987 record the final breaking point:

'Shri S. Maudgal, Director, Ministry of Environment and Forests who is also a member on the committee, could not attend the meeting but sent a message that he had nothing further to add to the comment forwarded vide their O.M.No. J-20012/22/86-IA dated 7.8.1987. Member Secretary said that these would be considered while examining individual projects.'

It was at this crucial meeting that three proposals were approved: those of Dalmia Resorts, Ramada and Oberois, all to be located on South Goa beaches. They were in effect approved without the concurrence of the MoEF.

In the meanwhile, in 1986, as part of its response to the Bhopal gas tragedy, Parliament passed the Environment Protection Act (EPA) which is in the nature of an overriding legislation. The Act came into force in November

Diksha resorts approved in sand dune area



1986. MoEF officials soon discovered that they would be able to demand and get proper EIA statements under the EPA separately and to insist on such environment clearance as distinct from IMC clearance.

Thus, a directive was issued around 1988 by the MoEF to the Director General of Tourism, New Delhi, asking that proposals for all beach resorts be routed through MoEF for separate environment clearance under EPA. The Ministry of Tourism was forced to concede. The MoEF was thus able to finally reject unsound projects. For the projects it approved, it set out a list of conditions enforceable under the EPA.

Beach areas are sensitive areas, and therefore, their conservation or protection cannot be reduced to a mere

set of environment conditions placed on individual constructions. The prior question to be answered is whether the topography or terrain allows such development. If this aspect were considered, then it is reasonable to argue that the MoEF was granting clearances without understanding what it was doing.

It is logical to assume that bureaucrats sitting in offices in New Delhi would have little idea of the nature of the natural environment on a south Goa beach, let alone an idea of the history of local efforts to protect the area as a biosphere reserve because of its inherent natural beauty.

In response to this challenge and partly on insistence from groups like the Goa Foundation—which even drew up an elaborate draft notification in this connection—the MoEF finally issued a notification declaring its intention to demarcate coastal areas into zones. Henceforth, development activity would have to conform to the rules applicable to the individual zones. This inaugurated a completely new area of beach conservation since it was now to be based on a statute. But how long would the new experiment last?

Coastal Regulations and the Coastal Zone Management Plan — On 19.2.1991, the Environment Ministry in Delhi issued the Coastal Regulation Zone notification requiring the State Government to prepare a Coastal Zone Management Plan for Goa's coastal areas within the period of a year.

With the new regulation, India became one of the first countries in the world to take legal steps to protect its beaches from unplanned development generally and to demarcate specific areas for conservation.

Under the notification, the State of Goa (like other coastal states) was bound to prepare a Coastal Zone Management Plan (CZMP) classifying the various beach areas in terms of three Coastal Regulation Zones (CRZ):

The State of Goa was to prepare the CZMP within one year of the notification, that is, by February 20, 1992. In the intervening period and till the CZMP was approved, the State Government could approve projects strictly in accordance with the classifications enunciated in the Regulation.

Not only did the Goa Government not prepare the CZMP within the stipulated period, that is by February 20, 1992, it also attempted to grant approvals in the coastal areas, violating provisions of the CRZ notification. Because of this the Goa Foundation filed a Writ Petition to restrain the Goa Government from approving any further plans and procured an order from the court to this effect on March 16, 1992. With the court order, some 110 projects were stalled for a period of nearly one and a half years.

The court intervention was instrumental, however, in goading the Government to prepare the CZMP in record time. When this was submitted to the Environment Ministry in December 1992, the draft CZMP showed that the State Government wanted to convert 69 km of the beach areas to Vasco or Mumbai kind of development, which is not permissible under the notification. Apparently, the Goa Government had submitted that an area of 69 km be considered as Coastal Regulation Zone II Category. If the conditions of the State Government were to be accepted, this would mean that 69 km of the coastline of Goa is substantially built up and has been pro-

vided with drainage, approach roads, other infrastructural facilities and sewerage mains, which is, to put it mildly, ridiculous.

The members of the Task Force appointed by the Ministry of Environment to approve the state CZMPs (including the Goa CZMP) finally visited Goa in April 1993. A formal hearing was granted to the Goa Foundation, during which the Foundation presented its own classification of the coastal areas with photographs and other material. The Task Force was thus able to have a separate and independent perspective on Goa from that presented by the State Government.

In the meanwhile, the apex court in a petition filed before it regarding non-implementation of the CRZ Notification, passed a detailed judgement on 18th April 1996, requiring the governments of all coastal states to prepare their coastal zone management plans and get these approved by the Environment Ministry by September 30, 1996. Several portions of the plan submitted by the Goa Government were rejected by the Central Government and by an order dated 27.9.1996, the Central Government imposed a more realistic classification Goa's coastal areas including provisions for protection of turtle nesting sites, mangrove areas, sand dunes and coral reef zones.

The State Government, however, continued to play cat and mouse with the implementation of the approved CZMP even after it was submitted in the Supreme Court. Again it was only after a petition was filed by the Goa Foundation in the High Court that the Advocate General on 15.7.1998 assured the Court that the State Government would implement the approved plan of 27.9.96.

On 26th November 1998, the Ministry of Environment constituted the Goa Coastal Zone Management Authority (GCZMA) for the state. The GCZMA now deals with approvals of coastal projects, and violations of CRZ notification laws. It functions from the office of the Director of Science, Technology & Environment (STE). The infamous Goa State Committee on Coastal Environment (GSCCE), which proved to be one of the most corrupt bodies in the state, largely controlled by the builders lobby (it even had as its members persons actually constructing buildings in CRZ areas in violation of CRZ laws) has been finally dissolved. All the files dealing with coastal matters have been taken away from the jurisdiction of the Chief Town Planner and his troupe in the Town & Country Planning Department—the mother of all corrupt departments in the state—and handed over to the Director of STE.

Whether the GCZMA will also degenerate and follow the sorry record of the GSCCE, only time will tell. For the moment, it appears the beaches may have some respite from the large-scale assaults launched against them in the last decade by developers and tourist lobbies.

REDI POLLUTION IN GOA

The continuing environmental disaster associated with the mining of iron ore in the village of Redi (in Maharashtra) is a classic instance of how ecologically illiterate governments and mining companies are willing to plunder nature for profits, blissfully passing off environment costs to others.

The village of Redi is situated on the southern tip of Maharashtra's coastline in Vengurla taluka, Sindhudurg district. It is a bare three kilometres from the north Goa boundary at Tiracol. During the late 1950s, rich reservoirs of iron ore were discovered in the area. The first excavations were begun in 1957 on a modest scale. The ore, exported mainly to Romania and Taiwan increased from 0.77 million tonnes in 1976-77 to more than 1.24 million tonnes in 1981. The mining extraction was carried out by two companies: (i) Gogate Minerals, and, (ii) New India Mining Corporation.

The generation of rejects at peak production time in the 80s was roughly estimated at 18 lakh tonnes for New India Mining Corporation and 10 lakh tonnes for Gogate Minerals.

Two plots situated right on the seacoast were used for dumping of these mining rejects: (i) Kanyalwadi (NIMC), and, (ii) Nagolawadi (GM). Besides dumping at these two spots, rejects were also directly dumped into the sea. How this could have been permitted by both the Maharashtra Government and the Ministry of Environment and Forests, New Delhi is not known.

Besides the direct dumping, a large quantity of accumulated waste has been washed into the sea by wind and wave action and in addition by rain during in the monsoons. This is because the dumps were never stabilised. The result is that even at present, with mining activities at a standstill, the coastal water is red and turbid and several beaches at Redi have now been completely destroyed by black ore.

As there is a sea current flowing southwards off Redi during the monsoon months, the turbidity has spread towards the beaches of Keri, Arambol, Mandrem and even Anjuna. The Goa Government had put up a note on the effects of the pollution on Goa beaches. The State Wildlife Advisory Board had written up a detailed note on Redi pollution in its booklet on Harmal, from which a good deal of the information given here is taken.

The village of Redi had an economy based on agro horticulture and fisheries. The mining operations completely destabilised the village production system, posing a threat to the very survival of the people. At this stage the National Institute of Oceanography (NIO) initiated an investigation. The results:

1. The open-cast mining has destroyed vegetation on a very large-scale in and around Redi with possible ill effects on the microclimate.
2. The mining operations as well as the stacking of dumps have been made without any planning whatsoever. The surface drainage of the area has therefore been totally disturbed, creating frequent problems of flooding and water logging.
3. Large quantities of soil have been washed from the dumps and have silted agricultural and horticultural,

areas, affecting fertility of the fields, and consequently production. Equally large agricultural areas have been rendered useless because of the dumps.

4. The major source of water for the settlement and also for irrigation was a 40-acre lake at Kanyalwadi. This is now in the process of rapidly getting silted up due to the erosion of the reject dumps in its vicinity.

5. In the early 70s, as there was no suitable land area available, the companies, allegedly with the permission of the port authorities, started the illegal and environmentally destructive practice of stacking rejects on the coast, as well as dumping them directly into the sea.

Between 10-15 million tonnes of rejects have so far been dumped into the sea, disturbing the marine ecology and the beaches. Observers report that dolphins, which were a common feature around Tiracol fort, have completely disappeared in the last decade.

Vast stretches of extremely picturesque beaches have been totally destroyed and their place taken by mountains of ore rejects, devoid of any greenery and a permanent source of contamination of the coastal waters.

The turbidity caused by the wash-off of the rejects into the water is apparent even to the naked eye. All along Redi, the sea is red throughout the year.

The beaches are covered with lateritic particles, making them uncomfortable to walk on. They also settle on the shallow sea bottom covering the rocky outcrops and reefs, the traditional grounds of coral and algae.

Pollution along the coast due to the Redi mines



The long term impact is irreversible damage to the rich marine environment of the Malvan-Sindhudurg coastal sea, unique in its diverse marine life, and in the process of being designated as a national marine park, by the Government of Maharashtra, based on NIO recommendations.

The NIO in its investigation discovered 28 species of algae in the area. Some species, in fact, were found fully covered with silt.

The environmental disaster continues, despite permanent stoppage of work at the mines. The companies involved must be compelled to produce an overall development plan for the restoration of the environment of Redi. They should also produce a rehabilitation plan to deal with the rejects lodged within the sea.

Salt pans

The salt pans, salt manufacture and the salt industry are all part and parcel of reclaimed mangrove areas. Almost all the salt every year is produced from February to May. Most Goan families stock salt for the entire year, buying it in bulk from the salt pan owners.

The Agricultural Land Development Panel has noted with concern in its report that a good number of the salt pans in Salcete and Tiswadi are being destroyed. The panel has estimated that flooding and erosion of salt pans have caused a net loss of 50,000 metric tonnes of salt production and over 3000 sustainable jobs.

This is an extremely serious loss. Salt production of the kind practised does not use any energy except that freely made available by the sun. The lands used for salt are generally lowlands and cannot be used for any other purpose. Killing the salt industry is therefore serves no rational purpose. It can only make Goans dependent on company produced white salt and that will signal the disappearance of one more distinctive aspect of Goan life.

At one time, the State government issued a notice banning the use of salt other than iodised salt on the grounds that research and surveys had shown that many people in Goa were getting prone to goitre. After an agitation, the government withdrew the notification and Goans are back to their beloved sea salt.

Deteriorating condition of Salt Industry situated in the Khazan Land Areas.

Year	Taluka	No. of villages producing salt	No. of Working salt pans	Area under salt pans	Total Production
1876	Pernem	5	21	40	3,000
1881	"	5	19	35	2,700
1891	"	5	16	28	2,200
1961	"	3	10	18	1,500
1991	"	2	9	16	1,000
1876	Bardez	8	64	110	8,500
1881	"	8	64	110	8,000
1891	"	8	61	106	7,700
1961	"	5	50	93	7,500
1991	"	3	30	60	5,000
1876	Tiswadi	11	104	260	18,000
1881	"	11	83	230	16,800
1891	"	11	80	224	16,500
1961	"	9	70	197	15,000
1991	"	5	45	108	9,000
1876	Salcete	12	197	210	14,000
1881	"	12	164	155	10,500
1891	"	12	111	120	8,500
1961	"	8	90	103	7,000
1991	"	3	35	55	3,000

Note : The Figures for Area in ha and Production in Metric Tonnes. Production figures are reasonable estimates only on the basis of production techniques, season and salt content of feed water.

Source: Unpublished research data of Shri Nandkumar Kamat on the 'Economic and Cultural History of the Salt Industry of Goa, Konkan and North Kanara.'

Saltpan



THE DANGEROUS PRINCESS

At 10.30 pm on Tuesday, 6th June 2000, the Salgaoncar-chartered transshipper, MV 'River Princess', ran aground on Sinquerim beach. High monsoon winds and rough seas dragged the ship from her anchorage in the mouth of the Mandovi River to her new resting place. Almost two years later, the Princess still squats there, even as the verbal and legal battles drag on. The worrying aspect of the ship on the beach is what is to be expected if it should break apart, as it surely will, in the storms of the coming monsoon.

The tourism industry, dominated in this area of Goa by mostly small hotels, is helplessly watching the charade being enacted. The hoteliers know for sure that if the ship breaks up, tourism in their part of the beach will take a severe beating and almost certainly take years to recover. The tourist industry will have to be replaced by ship-breaking!

According to newspaper reports, Salgaoncar Mining Industries Ltd. (SMIL) chartered the foreign vessel on a Bare Board-cum-Purchase basis from the Santa Barbara Onassis Shipping Company Ltd., Virgin Islands, for an eight-year period. According to SMIL, the River Princess is a 60,669 tonne dedicated bulk carrier. SMIL also states that the ship has been at anchorage in the Panjim Port jurisdiction since October 1998. So for at least 20 months, this big ship was left idle. This is a strange way of doing business.

But this is not the only strange feature of this ship and its owners/charterers.

In October 1998, the Liberian authorities withdrew their permissions and disallowed the Princess from flying the Liberian flag. So SMIL flew a Vanuatu flag. In October 1999, even the Vanuatu authorities deregistered the vessel. Thus, in June 2000, at the time when the ship drifted from its anchorage to its present stranded location, it did not exist according to international or local maritime authorities. This nonexistent ship had no master, flag, crew, propulsion system or insurance. Why would any business house pay charter fees for what appeared to be a piece of floating junk?

Recently the Maritime Marine Dept. (MMD) and the Captain of Ports (COP) issued stern warnings to small boat and canoe operators in Goa, demanding they register and license their vessels if they were in Goan waters. Surprisingly, neither of them appears to have been worried about the unlicensed presence of the behemoth (length 266.23 metres; breadth 40.2 metres; depth 21.4 metres) anchored for 20 months in the very mouth of the Mandovi River.

If one looks at the developments that have unfolded over the past eight months, the Goa government has won all the battles, but Anil Salgaonkar, MD of SMIL, has upto now won the war. Though Mr. Salgaonkar and his company are absolutely and strictly liable for the grounding of the ship on the beach, and therefore are absolutely bound to remove the ship, they have succeeded in allowing a long period to pass without having to do a thing. This no ordinary mortal could achieve. But this is probably because, in modern India, only ordinary mortals are forced to abide by the Constitution and the rule of law.

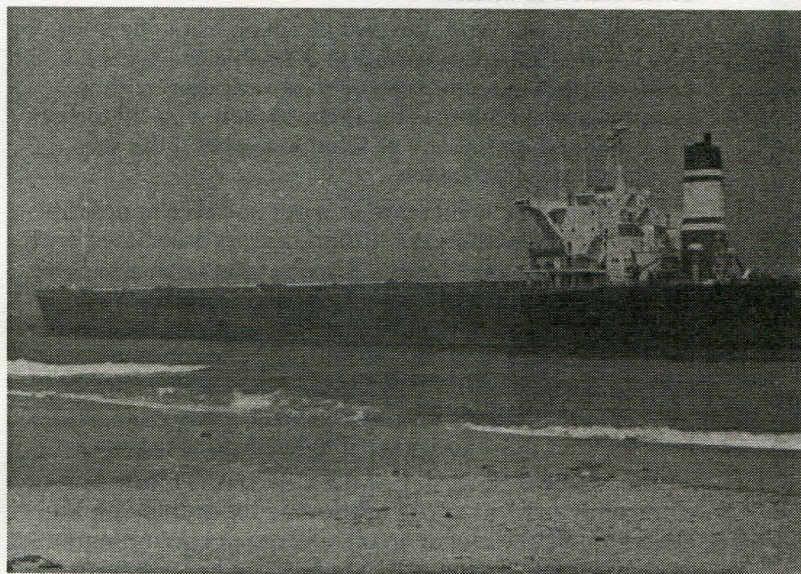
What is Mr. Salgaonkar's aim? As of today, there is no insurance money to foot the bill to tow the Princess to a safe place before the monsoon. If he is forced to do this nonetheless, there will be a large hole in his pocket as a consequence.

Therefore, SMIL at first requested the Government permission to break up the ship at site. However, ship-breaking at the present site would not be a punishment for an obvious crime, but a highly profitable and rewarding operation for SMIL. This is because Mr. Salgaonkar calculated that the public and the environment would pay the social and environmental costs, whilst he would get money for the iron and steel scrap.

To its credit, the Government refused permission for allowing the ship to be broken at the site. Mr. Salgaonkar is determined to see that the ship is broken at the site nonetheless. The time is fast running out. By the end of March, 2002, the sea will begin to get choppy and by the end of April, the sea will already be infested with huge breakers. By June first week, the ship will be ready to give up its seams and open up its insides.

The crux of the matter is the oil on board. Nobody seems to know for sure how much fuel oil, diesel or other oils and lubricants are actually carried in the holds and tanks of the ill-fated ship.

The River Princess grounded on the Candolim beach for nearly two years



SMIL says that the ship has 2 holds. Yet on 29.8.2000, the Coast Guard reported seeing the hatch of the 'centre hold' left open. A centre hold would need an odd number of holds. Not 2 holds.

The Pioneer (20.09.2000) reported a SMIL claim that there was less than 20 tonnes of oil on board. In the same report, Commandant Murthy of the Coast Guard reported the presence of 20 tonnes of oil in just one tank. There were other tanks which the Coast Guard were not allowed to inspect.

When the oil did spill into the sea in the first week of September 2001—despite all warnings—Goa's then Chief Minister Francisco Sardinha told the Coast Guard to deal with the spill at site but to utter nothing on the subject. The Coast Guard immediately thereafter pulled out. Why

would they want to be made to look inefficient and incompetent scapegoats? Whilst they dealt with, say, 80 tonnes of oil, the public would be told there was less than 20 tonnes on board. This way, the defaulter SMIL could even look good at the cost of the Coast Guard which was only trying to help.

In June 1994, when another vessel, the Sea Transporter, drifted to the rocks of Sinkerim during the monsoon, it was the Coast Guard which took complete charge and defuelled and salvaged the ship, towing it away without any damage either to the beach or the marine environment. But that was possible simply because the owners and the government cooperated.

The Coast Guard is the Central Nodal Authority for the control of marine pollution. Its Directorate of Operations has in fact prepared a National Oil Spillage Disaster Contingency Plan for precisely such contingencies. However, merely to oblige his friend, the former Chief Minister declared the River Princess out of bounds to the Coast Guard.

Let alone the Coast Guard, SMIL has refused to cooperate with any other authority over the fate of the ship. The Collector and District Magistrate, Sanjeev Khirwar, issued an order to SMIL to appoint Ericson and Richards (Vasco) to survey the ship and evaluate the scope of the damage. This order has been disobeyed. At least half a dozen meetings called by the Government, with various authorities, were cancelled simply because SMIL failed to attend.

Without a survey—the cost of which has to be borne by SMIL—the Goa administration is unable to prepare a Disaster Management Plan even now to deal with a possible ship breakup. This is the reason why till today the public are not aware of what to expect if the ship breaks up near the beach.

In a short article like this, it is not possible to describe the environmental and pollution horrors associated with a ship breaking on a beach. Anyone who wishes to have an inkling should visit the ship breaking yards at Alang and Sosiya on the Gujarat coast. The environment impact is devastating. The Alang beach sands are permanently stained with waste oil and sludge. The beach is littered with asbestos, pieces of iron and steel, glass wool, and a host of other non-biodegradable hazardous wastes.

The Member Secretary of the Goa State Pollution Control Board was asked to provide his opinion on the environmental effect of an oil spillage or contamination from the River Princess. In a letter dated 27.7.2000 to the District Magistrate, he described the ecological effects and impact of an oil spill:

'Most oils spilled are mixtures of several components having varying vapour pressure, density, viscosity and solubility in water. In the initial phase of spilled oil, the fractions of lighter molecular weight which are more volatile soluble, are preferentially leached out, leaving a residue which is denser and generally more viscous. Oil contains toxic organic compounds. It is not easily biodegradable. The bulk properties which are important to the spreading process (viscosity, density, surface tension and interfacial tensions) change slowly with time and spreading.

'Because of the slow biodegradation process, oil spills pose grave pollution threats to the marine environment. It

is well known from experience that once oil is broadly spread and dispersed, little-if-anything can be done to contain and/or collect it.

'The oil toxicity and its low biodegradation are two important key characteristics of its deleterious impact on the marine environment and on the communities of plants and biota living there. Marine ecosystems can be damaged in the following way:

- Direct oil coating of marine organisms leading to suffocation and death.
- Lethal toxicity of oil and petroleum product components.
- Serious ecological instability and habitat alterations.
- Dissolved oxygen (DO) depletion. Under average conditions, the complete oxidation of 1 litre of oil would deplete 400,000 litres of sea water of its dissolved oxygen.
- Hydrocarbon accumulation and food chain damage and breakdown.
- Alteration of plant and animal life responses.

'One should mention that the oil spill damage is immediate and more severe if oil spills occur near-shore areas and coastal zones, especially in estuaries, and enclosed bays. Presence of oil or tar globules on a beach has a grave impact on local communities though the loss or temporary damage to tourism and recreation resources.

'There are many deleterious effects which are not visible and which may only come to light after long periods of time. These sublethal effects may, in the long run, pose a much greater danger to the oceans than the death of a few biota for they may be much more widespread in area.'

With these sobering observations, we will leave it to the intelligence of our readers to draw their own conclusions about the consequences in the event of a breakup of the ship. Such a breakup should not be allowed under any circumstances.

In 2001, the Goa Assembly passed the Goa Tourist Places (Protection and Maintenance) Act, 2001 giving it necessary powers to remove any obstacles or nuisances that might affect tourism or tourism assets. After the Act was passed, an interminable amount of time was allowed to lapse simply because the Rules to operate the Act were not framed.

Finally, in December 2001, the competent authority under the Act (Director of Tourism) issued a notice to the owners of the vessel to have it removed. The owner did not reply. The Director of Tourism passed a final order, directing the owner to remove it. The owner appealed the order, saying it had been passed in violation of the principles of natural justice, i.e. he had not been heard. The matter was once again reverted to the Director of Tourism to cure the infirmity, which he did. Once again he passed a fresh order, requiring that the vessel be removed. The ship is still there. The Panchayat of Candolim has now moved the Court.

But citizens are now fully aware that despite all the powers given to the Government to protect the environment, it is unable to exploit such powers even when it has made up its mind. That indeed is an important revelation!

THE ESTUARINE REGION

This section deals with the second ecozone: the ecology of the alluvial plains, mud flats and estuarine areas. These are specialised habitats and Goa has many of them. They are not well understood in their dynamics which is why we allow them to be disturbed and damaged, often for frivolous reasons.

The mangrove habitat is not unique to Goa, but mangroves are an important part of the coastal ecosystem. Their many ecological functions are well-known. Though there is a government order banning the felling of mangrove species, we continue to fell them when we think it is necessary for development. The Forest Department is gamely attempting to regrow mangrove species in certain areas with some measure of success.

The Mandovi-Zuari estuarine complex is also little understood, which is why we have turned the mouths of these rivers into receptacles of waste, sewage and mining silt.

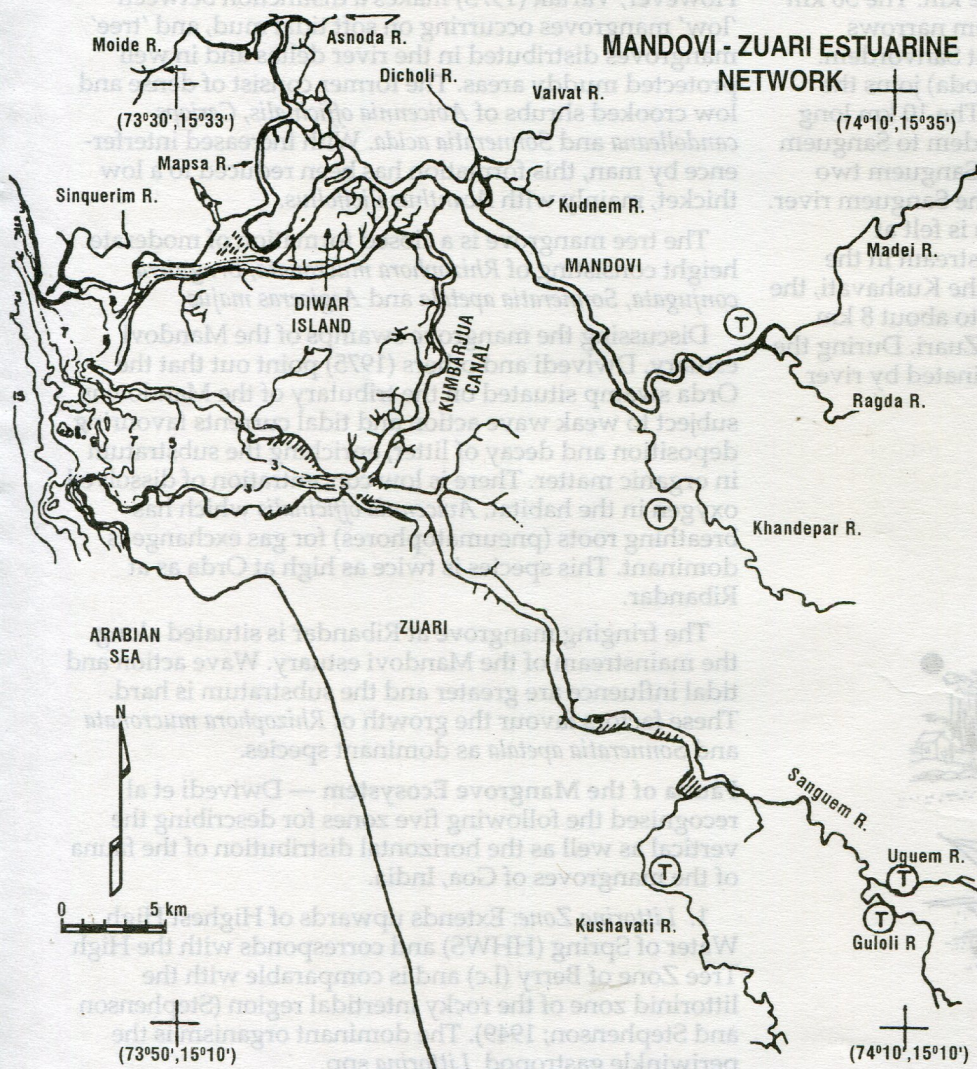
THE MANDOVI-ZUARI ESTUARINE ECOSYSTEM

The Mandovi and the Zuari are two estuaries located in Goa on the west coast of India; they join the Arabian Sea. The main channels of these estuaries are each about 50 km long and they are connected by a narrow channel, the Cumbarjua canal. At the upstream end, both estuaries receive freshwater from the rivers, which originate in the Western Ghat mountain ranges. A number of rivers/rivulets join the two estuaries. The Mandovi, the Zuari, the Cumbarjua canal and the rivers/rivulets form a network, which is used extensively for transport of goods (mainly iron ore), for fishing, and for dumping domestic and industrial waste. The increase in population and industrial activity in Goa during the last few decades has increased the dependence of the state on the network.

Simultaneously, issues related to the health of the estuarine network and to its ability to absorb additional impacts have gained importance. Addressing these issues requires an understanding of the hydrodynamics of the network. A first step towards this goal is the understanding of propagation of tides because they dominate the advective field. Earlier studies have accumulated considerable data on the seasonal cycle of hydrography and of

the chemistry of the estuarine network. Little, however, is known about propagation of tides in the network. Hence, a study based on observations and mathematical modelling was initiated. In this article, we describe the observations made as a part of the study, and infer prominent characteristics of tidal propagation. Though tides dominate the advective field, another process, the effect of the influx of freshwater brought in by rivers and rivulets that join the network, also needs to be considered. The freshwater enters primarily at the upstream end of the channels. Many points along the channels also receive freshwater. The influx is high during the south west monsoon (June-October), when most of the annual precipitation occurs over the catchment area, decreasing rapidly after the withdrawal of the monsoon. However, even during the dry season, at the upstream end of the channels the water is fresh.

A Physical description of the Mandovi-Zuari estuarine network — The Mandovi is widest, approximately 4 km, at the Aguada Bay. The 4 km-long stretch of the Bay is on average marginally deeper than the rest of the estuarine channel, the average depth in the Bay being about 5 m. River Sinquerim joins the Bay. The 6 km long stretch upstream of the Bay is on an average 750 m wide



and 5 m deep. The Mapusa river joins the Mandovi at the upstream end of this stretch. Farther upstream, Diwar Island, approximately 11 km long, bifurcates the Mandovi into two channels. Before rejoining at the upstream end of the island, the two channels lead into an extensive network of narrow channels in a marshy area. The Cumbarjua canal joins the Mandovi about 4 km upstream of the Diwar island. The 30 km stretch of the main channel of the Mandovi, from the eastern edge of the Diwar island to Ganjem, gets progressively narrower and shallower in the upstream direction. Rivers Dicholi, Valvat, Kudnem and Khandepar join the Mandovi along this stretch. Khandepar is the largest of the four rivers and is fed by the river Dudhsagar at its upstream end. The locations up to which tidal influence is felt on these rivers are noted in figure. During the dry season, in the main channel of the Mandovi, tidal influence is seen only till a little upstream of Ganjem. Farther upstream the channel bifurcates into the rivers Madei and Ragda. The Mapusa river, which joins the Mandovi at Penha de France, has at its upstream end the rivers Asnoda and Moide. The Mapusa river and its tributaries are joined by a large network of small rivulets, which often flow through marshy areas.

The Zuari estuary is bigger than the Mandovi. The 10 km stretch upstream from the mouth of Zuari is approximately 5 km wide and 5 m deep: It is known as Mormugao Bay. At the upstream end of the Bay the channel narrows to a width less than one km. The 30 km long channel from Cortalim to Sanvordem narrows progressively. It is less than 50 m wide at Sanvordem. The Kushawati river (also known as Paroda) joins the Zuari 4 km downstream at Sanvordem. The 10 km long stretch of the main channel from Sanvordem to Sanguem is also known as the Sanguem River. At Sanguem two rivers, Uguem and Guloli, join to form the Sanguem river. During the dry season, the effect of tides is felt at Sanguem and possibly as far as 4 km upstream in the Uguem river and 1 km in the Guloli. In the Kushavati, the tidal influence appears to be present up to about 8 km upstream of the point where it joins the Zuari. During the wet season, the flow at Sanguem is dominated by river run-off.

S.R. Shetye et al



MANGROVES: INTRODUCTION

Mangroves (salt-tolerant forests) are a significant component of the Goan bio-region. Due to the topography (the Western Ghats begin a short distance from the coast, the estuarine regions are not very large), the occurrence of mangroves in Goa is not as deep as when compared with the east coast of the country. Nevertheless, Goa's mangroves are fairly extensive, with about 0.5 per cent of the state's area being covered by them. They are to be found mainly along the estuaries.

Goa is drained by seven major rivers, of which the Mandovi and the Zuari—with the Cumbarjua canal—form the largest estuarine complex. A 1982 National Institute of Oceanography (NIO) study reveals that the total area covered by these unique salt-tolerant tree species is to the order of 2000 hectares, of which 700 ha are to be found along the Mandovi, 900 ha. along the Zuari, and 200 ha. along the Cumbarjua canal, with the remainder along the other five major rivers. More precise data is now available in Jagtap's doctoral dissertation on the same subject.

Mangrove Types — Mangroves are generally distributed along the West Coast of India, and Goa is no exception. Blasco (1975) in his *Monograph on the Mangroves of India*, does not mention any area under mangroves in Goa. However, Vartak (1973) makes a distinction between 'low' mangroves occurring on soft tidal mud, and 'tree' mangroves distributed in the river deltas and in well protected muddy areas. The former consist of dense and low crooked shrubs of *Avicennia officinalis*, *Ceriops candolleana* and *Sonneratia acida*. With increased interference by man, this formation has been reduced to a low thicket, mainly with *Acanthus ilicifolius*.

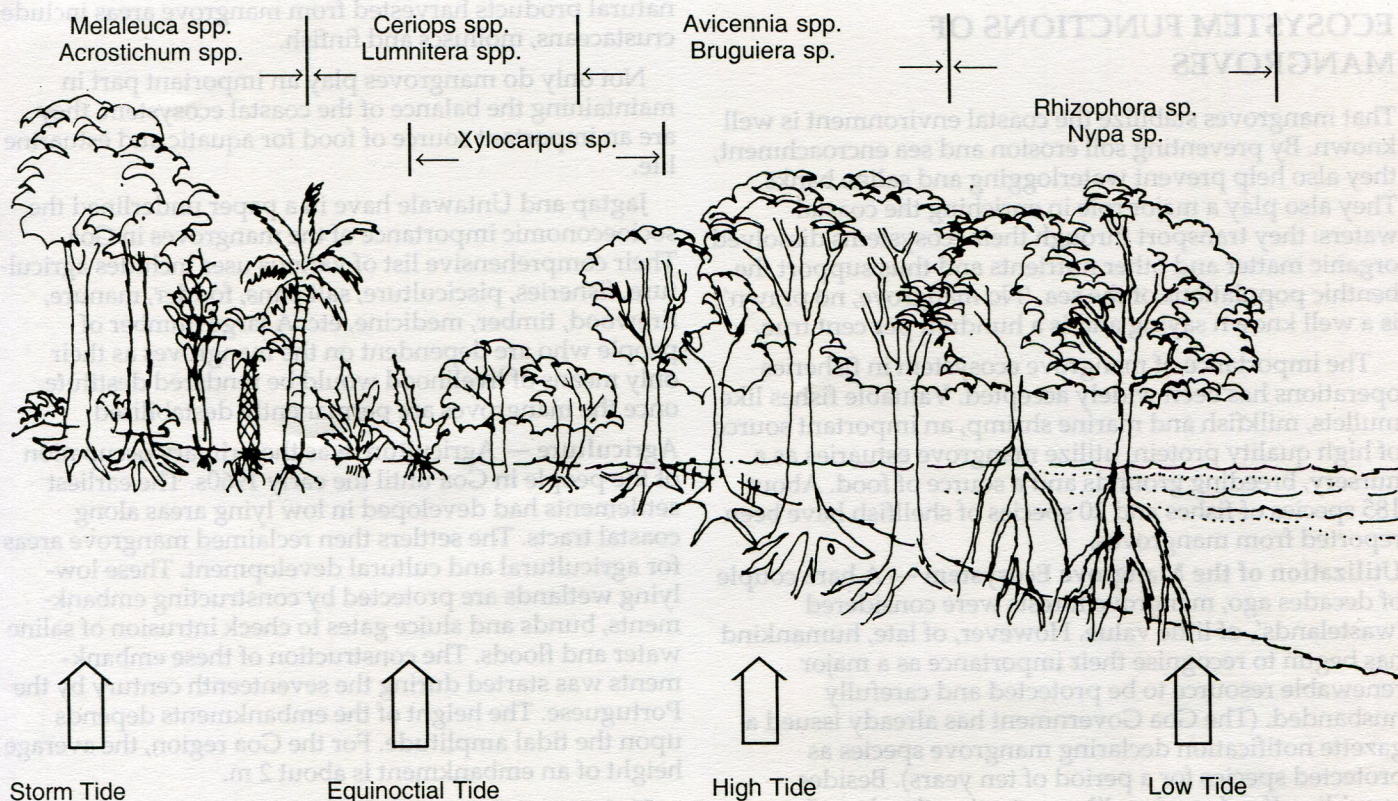
The tree mangrove is a closed formation of moderate height consisting of *Rhizophora mucronata*, *Bruguiera conjugata*, *Sonneratia apetala* and *Aegiceras majus*.

Discussing the mangrove swamps of the Mandovi estuary, Dwivedi and others (1975) point out that the Orda swamp situated on the tributary of the Mandovi is subject to weak wave action and tidal currents favouring deposition and decay of litter, enriching the substratum in organic matter. There is low concentration of dissolved oxygen in the habitat. *Avicennia officinalis* which has breathing roots (pneumatophores) for gas exchange is dominant. This species is twice as high at Orda as at Ribandar.

The fringing mangrove at Ribandar is situated along the mainstream of the Mandovi estuary. Wave action and tidal influence are greater and the substratum is hard. These factors favour the growth of *Rhizophora mucronata* and *Sonneratia apetala* as dominant species.

Fauna of the Mangrove Ecosystem — Dwivedi et al recognised the following five zones for describing the vertical as well as the horizontal distribution of the fauna of the mangroves of Goa, India.

1. **Littorina Zone:** Extends upwards of Highest High Water of Spring (HHWS) and corresponds with the High Tree Zone of Berry (l.c) and is comparable with the littorinid zone of the rocky intertidal region (Stephenson and Stephenson; 1949). The dominant organism is the periwinkle gastropod *Littorina* spp.



General Mangrove Ecosystem

2. *Nerita* Zone: Corresponds to the lower tree zone of Berry where the dominant species are the *Nerita* spp. It varies in extension according to tidal range. Upper and lower limits of this zone are bound by HHWS and Mean Sea Level (MSL), respectively.

3. *Barnacle-Oyster* Zone: Extends between MSL and MLLW (Mean Lower Low Water) and is populated mainly by *Balanus* and *Crassostrea* spp. While corresponding with Berry's marginal zone in having barnacles as the dominant species, it differs because of its high tide level and the presence of bivalves.

4. *Uca* Zone: Lies below MLLW and extends below LLWS (Lower Low Water of Spring). Dominant species are the fiddler crabs, *Uca* spp. and important associations are *Cerithidea* spp. and hermit crabs.

5. *Polychaete* Zone: Narrow vertical demarcation but maximum horizontal expanse. Populated by a variety of crabs, mud lobsters, gobiid fishes, but the dominant organisms are polychaete worms, distributed upto 10 cm down within the substratum.

The intertidal and the intra-terrestrial fringe tend to have the distribution pattern of characteristic species, like land crabs, set by physical factors, whereas biological factors become more important in setting limits to the mid-littoral and sublittoral zones. Physical and/or biological factors do not act in isolation. Result: the final pattern observed, on a small or large-scale, is the result of the interactions among several factors.

Commonest epifaunal forms are gastropod molluscs, represented by a number of snails, whelks, etc; bivalve molluscs, mainly oysters; crustaceans, represented by a

variety of crabs, shrimps, mud lobsters and barnacles; and fishes of which the commonest form is the mud skipper.

In contrast, the infaunal forms are few and are mainly represented by nematodes and polychaetes.

Higher vertebrate faunal elements are represented by marsh crocodile, fish cat and others.

Migrant forms are many, but commercially important ones are the young stages of shrimps and fishes like the mullets which use the mangrove ecosystem as shelter and nursery grounds.

Arun H. Parulekar



ECOSYSTEM FUNCTIONS OF MANGROVES

That mangroves stabilize the coastal environment is well known. By preventing soil erosion and sea encroachment, they also help prevent waterlogging and saline banks. They also play a major role in enriching the coastal waters: they transport through their ecosystems dissolved organic matter and other nutrients and thus support the benthic populations of the sea. 'No mangrove, no prawn', is a well known saying and is a hundred per cent true.

The importance of mangrove ecosystem in fisheries operations has been widely accepted. Valuable fishes like mullets, milkfish and marine shrimp, an important source of high quality protein, utilize mangrove estuaries as a nursery, breeding grounds and a source of food. About 185 species of fishes and 20 species of shellfish have been reported from mangroves.

Utilization of the Mangrove Ecosystem — A bare couple of decades ago, mangrove forests were considered 'wastelands', of little value. However, of late, humankind has begun to recognise their importance as a major renewable resource to be protected and carefully husbanded. (The Goa Government has already issued a gazette notification declaring mangrove species as protected species for a period of ten years). Besides providing 'free' services like protecting the shore from erosion, and cleaning up the water, the mangrove ecosystem plays an important role in economic activities. The commercial and traditional products obtained from the mangrove ecosystem range from construction material to medicine and honey. Mangroves are a potentially sustainable source of wood and charcoal for meeting the increasing needs of developing countries for domestic fuel (the calorific value of mangrove wood is three times that of other woods.) In some areas, mangroves are the sole

source of fuel and fodder during dry periods. Other natural products harvested from mangrove areas include crustaceans, molluscs and finfish.

Not only do mangroves play an important part in maintaining the balance of the coastal ecosystem, they are an important source of food for aquatic and estuarine life.

Jagtap and Untawale have in a paper underlined the socioeconomic importance of the mangroves in Goa. Their comprehensive list of various uses includes agriculture, fisheries, pisciculture, salt pans, fodder, manure, firewood, timber, medicine, etc. A large number of people who are dependent on the mangroves as their only means of livelihood would be rendered destitute once the mangroves are permanently destabilised.

Agriculture — Agriculture was the primary occupation of the people in Goa until the early 1960s. The earliest settlements had developed in low lying areas along coastal tracts. The settlers then reclaimed mangrove areas for agricultural and cultural development. These low-lying wetlands are protected by constructing embankments, bunds and sluice gates to check intrusion of saline water and floods. The construction of these embankments was started during the seventeenth century by the Portuguese. The height of the embankments depends upon the tidal amplitude. For the Goa region, the average height of an embankment is about 2 m.

These low-lying marshy areas are interspersed by cross canals which provide smooth flow of flood water and tidal currents. During the rainy season (June to September), the canals silt, damaging the paddy fields. Out of Goa's total paddy land, about 14-15 thousand hectares are low-lying, and are called *Khazan* lands. Besides paddy, ragi and pulses are also cultivated in these lands. A few of the mangrove areas towards the upstream regions of the estuaries have been reclaimed for coconut plantation.

Mangrove related fisheries — Mangrove related fisheries fall under two categories:

Capture fisheries: Mangrove estuarine waterways are used for traditional fishing of various species of fishes, crustaceans and shellfish. Besides open sea fishing, about 1,500 tonnes of seafood are harvested from the creeks, estuaries and backwaters of Goa, sprawling over an estimated area of 200 sq km. The major species harvested in the mangroves of Goa are clams (*Meretrix* sp.), Oysters (*Crassostrea* sp.), Prawns (*Penaeus* sp.), Crabs (*Scylla serrata*) and Mulletts (*Mugil cephalus*).

Captive Fisheries: A preliminary study of the status of different traditionally practised forms of aquaculture was carried out by A. Parulekar and X.N. Verlencar of the National Institute of Oceanography and published in 1984. The study records three different kinds of aquaculture practised in Goa 'from time immemorial'. The first involves

A view of mangroves at Cumbarjua

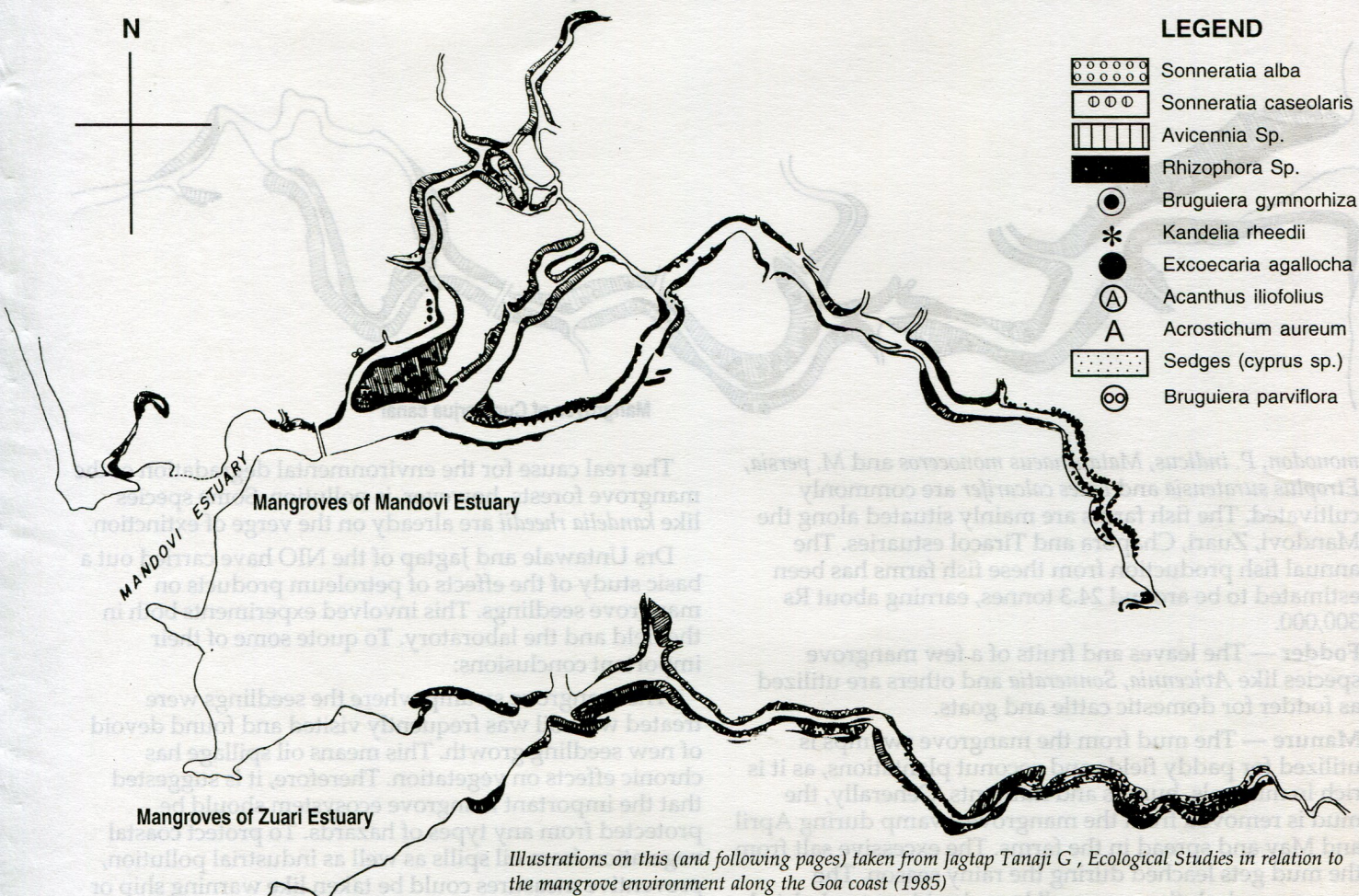


Harvey D'Souza

the use of permanent fish farms, the second the use of ponds for salt and fish production alternatively and the third the nurture of fish in *khazan* lands. The reader is referred to the section on *khazan* lands on for more information on aquaculture in *khazan* lands. We shall deal here only with the permanent fish farms and the salt pans.

Permanent Fish Farms: These farms of varying dimensions are generally situated close to estuaries or tributaries of a river. They are surrounded by dense mangrove vegetation and the ponds are raised by mud embankments and lateritic boulders. The flow of water in and out of the pond is regulated by sluice gates fitted with wooden planks.

Mitache Agar: The second type of fish cultivation which involves salt pan-cum-fish culture is known as *Mitache Agar*. During the monsoon season, salt pans are inundated with brackish water through the sluice gate. The gate is closed at the end of August and the fish allowed to go inside the pond until December. When the pond is completely drained out, the fish is harvested within three to four days, by nets at the sluice gate. On one side of the pond a wide but shallow channel is dug for maintaining fish larvae which will serve as stock for the next season. The ponds are then completely sun dried and small rectangular pans prepared. Water is taken in during spring tides for the extraction of salt from February to May. In such farms, fish production is considered basically as a secondary crop.



Illustrations on this (and following pages) taken from Jagtap Tanaji G, *Ecological Studies in relation to the mangrove environment along the Goa coast* (1985)

In May and June every year, the sluice gates are kept open and the tidal inflow allows the entry of fish and prawn larvae into the pond. The larvae are allowed to grow, and by September-October attempt to move out of the pond. Exchange of water between river and pond is allowed, but regulated during the spring and neap tides. Fine mesh nets are used at the sluice gates to prevent the escape of the fish and prawn from the pond. Small branches of trees are also stuck in the pond to provide shelter to the fish and to obstruct poaching. Harvesting is carried out from February to April and is done mainly by nets fixed at the sluice gates. The fish are caught as the water leaves the pond. Such fish ponds, note Parulekar and Verlenkar, are few in number and located largely in Salcete taluka.

To quote Parulekar and Verlenkar: 'Different varieties of fish and shrimp larvae enter the pond in the monsoon season along with the tidal inflow. The prawns are mostly *Metapenaeus monoceros*, *Penaeus monodon* (locally known as *Waghi*) and *P. indicus*. Important species of fish are mullets (*Mugil cephalus* and *M. parsia*)—locally known as *Sevtali*, milkfish (*Chanos chanos*)—locally known as *Gholshi*, pearl spot (*Etroplus suratensis*)—locally known as *Kalundra* and *bhekti* (*Lates calcarifer*)—locally known *Chanyak*. Species of lesser importance are *Tamboshi* (*Lutianus sp.*), *Kharchani* (*Gerres sp.*) and *Banoshi* (*Theraps sp.*). Large numbers of predatory species like *Therapon jarbua* also grow in the farm. *Bhekti*, a highly carnivorous species, is detrimental, especially to shrimps. These predators are generally removed by angling or netting.

'The species composition is almost similar in all the three categories of fish farms, but in *khazan* type of fish farming, prawns are dominant.'

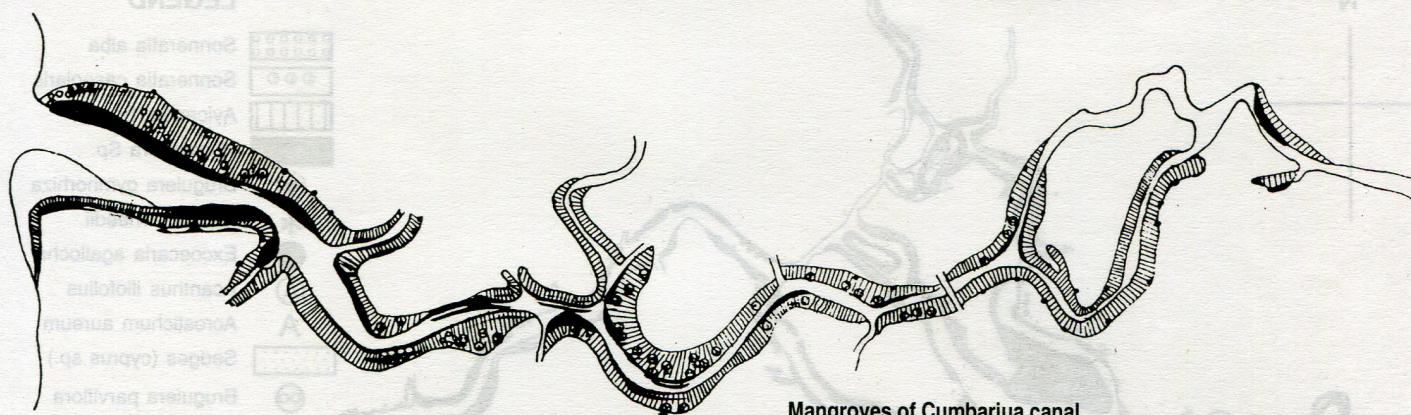
Parulekar and Verlenkar estimate that about 50 tonnes of fish is harvested from different fish farms and sluice gate systems in Goa. This is just about 0.1 per cent of the total marine fish landing in Goa. Even though these figures are under reported, it is doubtful whether for some time at least aquaculture will dramatically change the availability of fish in the State.

Fish farming in the mangrove area is very common along the Goan coast. Fish farms are either permanent ponds or paddy fields used as fish farms. An area of about 727,900 sq m in the mangroves has been estimated to be utilized for fish farming. Prawn species like *Penaeus*

extract from the leaves of *Bruquiera oymnorhiza* was observed to be effective in reducing cholesterol in the blood.

Mangrove Degradation — Unfortunately, in this area too, one witnesses the same process of environmental degradation, as is seen in all other aspects of the Goan environment.

Before Goa's liberation in 1961, the people living around mangrove areas lived in harmony with them and exploited them for their needs without causing them any harm. But, in the last 20 years or so, this idyllic picture has undergone drastic changes. Increasing pressure on natural resources has led to mangroves being exploited beyond their sustainable potential. This has created a number of problems for the mangrove ecosystem.



Mangroves of Cumbarjua canal

monodon, *P. indicus*, *Matapenaeus monoceros* and *M. persia*, *Etroplus suratensis* and *Lates calcarifer* are commonly cultivated. The fish farms are mainly situated along the Mandovi, Zuari, Chapora and Tiracol estuaries. The annual fish production from these fish farms has been estimated to be around 24.3 tonnes, earning about Rs 300,000.

Fodder — The leaves and fruits of a few mangrove species like *Avicennia*, *Sonneratia* and others are utilized as fodder for domestic cattle and goats.

Manure — The mud from the mangrove swamps is utilized for paddy fields and coconut plantations, as it is rich in minerals, humus and nutrients. Generally, the mud is removed from the mangrove swamp during April and May and spread in the farms. The excessive salt from the mud gets leached during the rainy season. The mangrove slash (leaves, small branches) is spread, dried in the farm and burnt. The ash acts as a fertilizer.

Firewood and mangrove timber — Timber from the mangroves is used in minor construction by rural communities. The smaller branches of cut mangroves are used for fuel, fencing and as stakes for fishing nets. Generally, species of *Avicennia*, *Sonneratia* and *Rhizophora* are utilized for timber and firewood. The constant indiscriminate cutting of mangroves has resulted in the disappearance of large mangrove areas along the coast.

Medicinal use — *Acanthus ilicifolius* contains some bioactive compounds which act as antiseptics; hence, extracts from the leaf and fruit are used for dressing wounds. The root and stem of *Dirros heterophylla* contain a weak poison and are used for narcotizing fishes. The

The real cause for the environmental degradation of the mangrove forests, however, is pollution. Some species like *kandelia rheedii* are already on the verge of extinction.

Drs Untawale and Jagtap of the NIO have carried out a basic study of the effects of petroleum products on mangrove seedlings. This involved experiments both in the field and the laboratory. To quote some of their important conclusions:

'The mangrove swamp where the seedlings were treated with oil was frequently visited and found devoid of new seedling growth. This means oil spillage has chronic effects on vegetation. Therefore, it is suggested that the important mangrove ecosystem should be protected from any types of hazards. To protect coastal vegetation from oil spills as well as industrial pollution, preventive measures could be taken like warning ship or trawler owners not to wash their tankers within the estuary and maximum care should be taken not to spill oil into it. Industrialists also should be warned not to release the effluents into the estuary.'

Dr. Jagtap is equally lucid in arguing for better pollution control. He points out that there is no management plan for utilisation of mangroves in Goa and it is for this reason that activities like 'indiscriminate cutting, reclamation, overgrazing, etc. have severely degraded the mangroves along the Goa coast'.

He goes on to say, 'If the degradation of mangroves continues at the same rate for another decade there will not be many mangroves left along the Goa coast, which will adversely affect the mangrove-related fisheries.' He suggests that the Government take up a mangrove

Mudskippers of the Mangroves

One of the most amazing inhabitants of the mangrove ecosystem is the mudskipper, basically a fish like a goby but which is able to emerge from the water on the surface of the wet muds at low tide. Its eyes are placed on top of its bulbous head and it is constantly on the alert for predators, which it avoids by a sudden straightening of its bent tail, enabling it to leap over half a metre.

Its most remarkable feature, however, is its ability to breathe not only through its gills, but also through its wide mouth and throat, absorbing oxygen from the air in a most un-fishlike manner. It is the scarcity of oxygen in this type of habitat which has led to this piece of adaptive evolution.

'Mudskipper' is a common name for several fishes of the genus *Periophthalmus*, of the goby family, found in coastal waters of the Indian and Pacific oceans. They live chiefly on mud flats and in brackish mangrove swamps and are adapted for remaining on dry land when the tide goes out. They have no special air-breathing organs, but absorb oxygen through the skin and gill chambers as long as these remain moist. When out of water, mudskippers use the fleshy bases of their pectoral fins for propulsion on the ground, and members of the larger species can skip faster than a person can move. The mudskipper's diet includes insects and small fish. About 8 in. (20 cm) long, it is olive brown, often with bluish markings. Its protruding, mobile eyes give it a frog-like appearance. It is classified in the



Mudskipper

phylum *Chordata*, subphylum *Vertebrata*, class *Osteichthyes*, order *Perciformes*, family *Gobiidae*.

Mangroves of Tiracol Estuary

Mangroves of Chapora Estuary

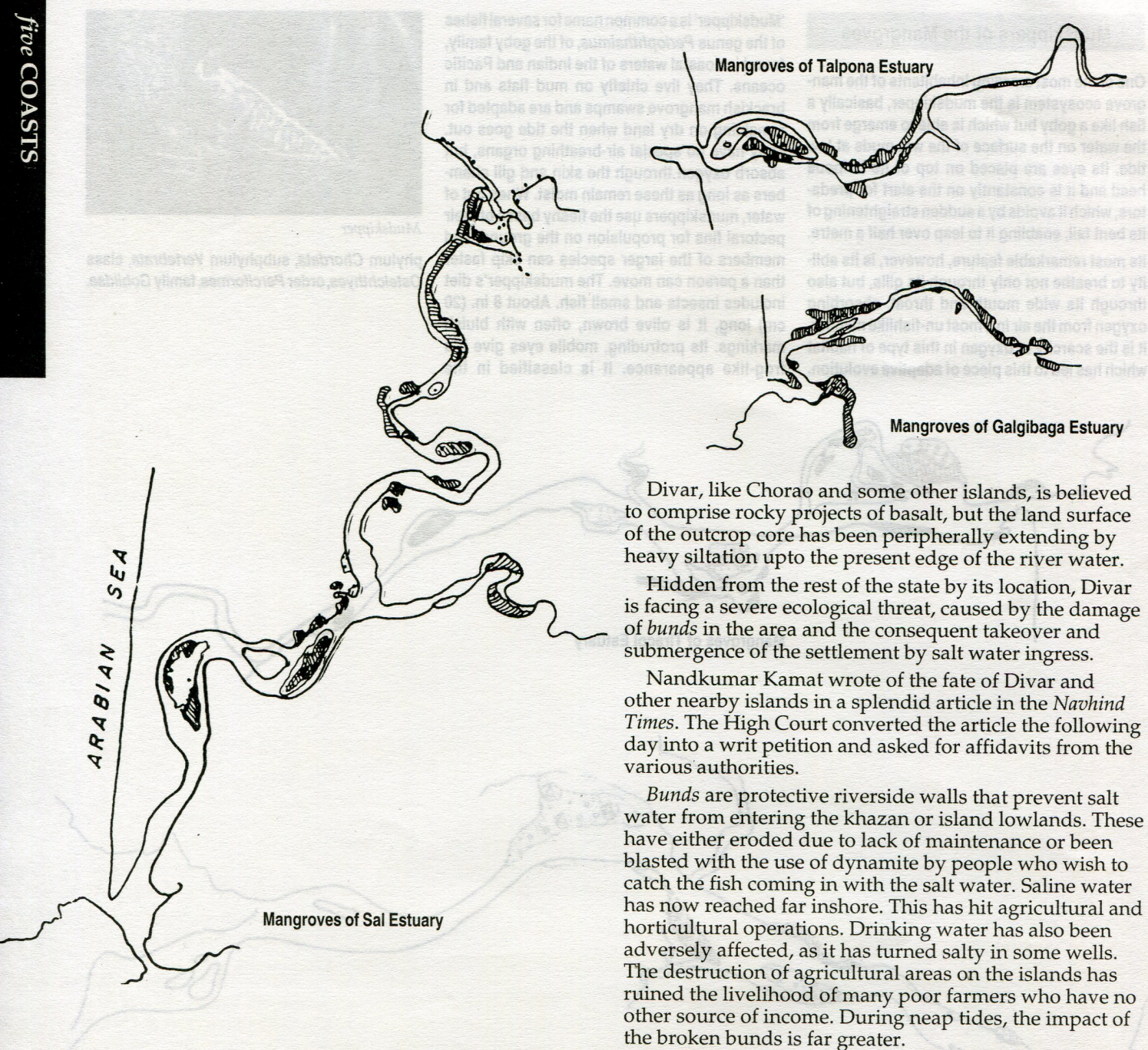
cultivation programme and ensure that deforestation and reclamation stop.

The mangroves along the Zuari are facing the biggest threat. This is understandable, since a part of Mormugao is located at the mouth of the Zuari. But the Mandovi and the Cumbarjua canal are also threatened. And the other rivers are facing other equally severe problems.

The Goa Government should take the following protective measures to save mangroves from further destruction:

- Deforestation should be stopped
- Cultivation of mangroves should be taken up
- Reclamation of mangroves should be stopped.

The mangrove forests are an important part of the environment in Goa which can still be saved. It is necessary to act firmly and decisively. Strict regulation of oil dumping by shipping is necessary. Effluent treatment plants in all factories discharging effluents into rivers are a must. This, combined with other measures given above should ensure that the generations to come will also benefit from this rich legacy.



DIVAR ISLAND

Goa has two types of islands. The first are rocky islands like those off the Mormugao coast. Piedade in the Mandovi estuary, and Anjediv are protrusions of a drowned topography separated from the mainland by faulting.

Other islands are of the alluvial type, like that of the Cumbarjua group, created by the heavy deposit of silt by the rivers in their estuaries. Many alluvial islands are not so obvious in the landscape, as they are now connected by roads and bridges.

Divar stands prominently in the mid-course of the Mandovi river, which rises in the main Sahyadris in Karnataka state.

Divar, like Chorao and some other islands, is believed to comprise rocky projects of basalt, but the land surface of the outcrop core has been peripherally extending by heavy siltation upto the present edge of the river water.

Hidden from the rest of the state by its location, Divar is facing a severe ecological threat, caused by the damage of *bunds* in the area and the consequent takeover and submergence of the settlement by salt water ingress.

Nandkumar Kamat wrote of the fate of Divar and other nearby islands in a splendid article in the *Navhind Times*. The High Court converted the article the following day into a writ petition and asked for affidavits from the various authorities.

Bunds are protective riverside walls that prevent salt water from entering the khazan or island lowlands. These have either eroded due to lack of maintenance or been blasted with the use of dynamite by people who wish to catch the fish coming in with the salt water. Saline water has now reached far inshore. This has hit agricultural and horticultural operations. Drinking water has also been adversely affected, as it has turned salty in some wells. The destruction of agricultural areas on the islands has ruined the livelihood of many poor farmers who have no other source of income. During neap tides, the impact of the broken bunds is far greater.

'This never happened for centuries when the *bunds* were maintained and villagers lived in harmony with nature. We are now literally sinking,' says Luis de Souza, who hails from Divar and has been studying the problem for some time now.

It is not quite clear why this problem has got aggravated in recent times. However, environmentalists concede that the problem is 'extremely serious', with large parts of the island, especially paddy and vegetable growing areas, now being inundated by salt water, thus threatening farming operations. Contamination of the soil by salt water is also extensive. Roads are flooded when there is high tide, so buses refuse to ply.

Now, unless immediate actions are taken, the island itself could start shrinking. If the problem is not sorted out with an effective permanent solution, only the settlements on high ground may survive the disaster. All else will go.

Protected Mangrove Species

In September 1990, the Goa Government issued a gazette notification banning the felling of the following mangrove species for the next ten years:

1. *Rhizophora mucronata*
2. *Kandelia rheedii*
3. *Avicennia officinalis*
4. *Sonneratia alba*
5. *Ceriops lagal*
6. *Excoecaria agallocha*
7. *Rhizophora apiculata*
8. *Bruguiera gymnorhiza*
9. *Avicennia marina*
10. *Sonneratia caseolaris*
11. *Aegiceras corniculatum*
12. *Acanthus ilicifolius*
13. *Derris heterophylla*
14. *Acrostichum aureum*
15. *Bruguiera parviflora*

On 24.8.2000, the government extended the ban 'until further orders'.

Restoring Mangroves



A view of new mangroves at Chorao

The total mangrove area in Goa is estimated at 2000 hectares and occurs along Zuari, Mandovi, Mapusa and Madkai rivers and along the Cumbarjua canal. A mangrove nursery covering an area of one hectare exists at Chorao. Serious

efforts are being made to restore mangrove areas to their original glory. The Salim Ali Bird Sanctuary at Chorao is an example of prime mangrove vegetation.

Source: Forest Departments statistics

Details of New Mangrove Plantations

Year	Location	Area in ha
1 1985-86	Chorao	75.00
2 1986-87	Chorao	12.50
	Zuari	8.00
3 1987-88	Chorao	56.00
4 1988-89	Chorao, Cumbarjua	48.75
5 1989-90	Cumbarjua	54.75
6 1990-91	Mapusa river	26.50
7 1991-92	Mapusa Ekoshi, Borim Shiroda & Madkai	50.00
8 1992-93	Mapusa Ekoshi, Borim Shiroda & Madkai	150.00
9 1993-94	Mapusa Ekoshi	100.00
10 1994-95	Colvale, Borim	150.00
11 1995-96	Colvale, Borim, Rasai	146.05
12 1996-97	Manken	48.55
13 1997-98	Chorao, Colvale	101.55
14 1998-99	Terekhol, Vazangal, Kundaim	100.00
15 1999-00	Colvale, Panchwadi, Betki (proposed)	100.00

Local Awareness of Coastal Ecosystems

As part of an overall study to examine the interrelation between population, consumption and environment focussing on coastal tourism, TERI conducted a survey to find out popular perceptions relating to sand dunes, mangroves and *khazans* in 5 villages of Calangute, Anjuna, Cavelossim, Varca and Poinguinim.

The survey indicated that in all 5 villages there is a high level of awareness of the extent of the 3 coastal ecosystems, though a higher percent discloses such knowledge in relation to sand dunes and *khazans* when compared with mangroves. For sand dunes, highest awareness is observed in Calangute and Cavelossim and least in Poinguinim and Anjuna, which conforms to the fact that the former villages have large sand dune stretches. Least awareness of all was observed in Anjuna.

The study also reported that those without any formal education showed a higher level of awareness when compared with the educated.

The second aspect of the survey related to perceptions about resource use and the study related these perceptions to personal or community use of ecosystems. The study observed that awareness of community use of ecosystems was much higher than personal use of ecosystems. Among the ecosystems, mangroves were perceived as of least personal use followed by sand dunes and *khazans*.

About perceptions of degradation of such ecosystems, the majority of households (78%) feel there has been degradation over the last 15 years. Of those with this opinion, the response is highest for sand dunes, followed by *khazans* and mangroves.

The study also found that over 80% of households feel that sand dunes and *khazan* lands need to be protected while 67% households supported mangrove protection. Except for Poinguinim—where a larger number of households supported protection of mangroves—all other tourist destinations showed a more protective attitude towards sand dunes and *khazan* lands. The households reported the following reasons for protection of these ecosystems:

- a. Their villages depended on them.
- b. They were part of the village resources.
- c. They protect the village (sand dunes).
- d. They had always been there (mangroves and *khazan* lands).

For more details, consult the full study which is available with TERI, Goa office.

CROCODILES

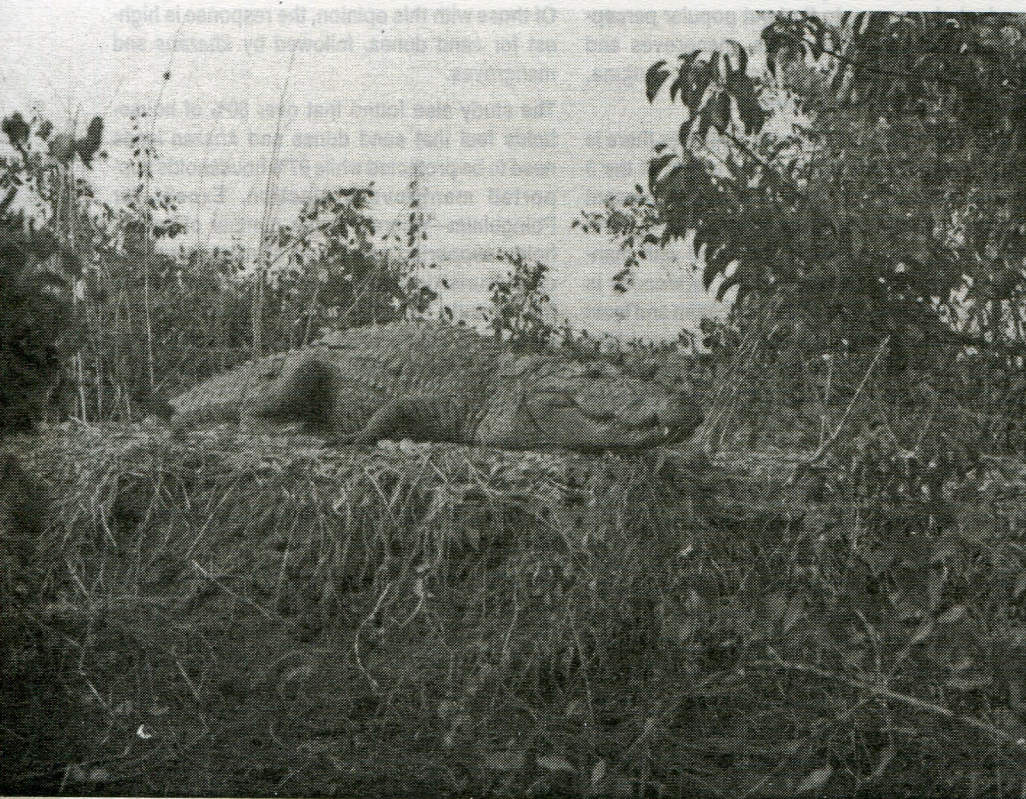
Along with turtles, crocodiles and monitor lizards are also found in Goa. Monitor lizards (*Varanus bengalensis*) are under increasing threat in the coastal areas of Goa, where they were at one time commonly found. Part of the reason for this is the unreasonable aversion that many humans feel toward reptiles, causing them to even kill the common house lizard, which plays a useful role in keeping down the insect population within homes. Apart from this, monitor lizards are even eaten. The greatest threat to the lizards comes from the use of their skins in traditional drums, the 'ghumot'. This persists when perfectly adequate substitutes are available. Traditional medicine quacks also capitalise on the mistaken belief that the blood of this creature is a treatment for asthma. The Forest Department needs to act firmly if people are to stop using the lizards for such purposes.

Fortunately though, on the crocodile front, things seem to be looking up.

It has been firmly established that the existing species of crocodile in Goa is the Marsh Crocodile, *Crocodylus palustris* (Leeson). The animal is locally known as 'mannge' or mugger.

The possibility of an interspecific population in Cumbarjua was ruled out in an authoritative study done in 1993 by Manoj Borkar et al. for the WWF—Goa Division. This helped to clear up many misconceptions regarding the crocodiles in Goa. Since marsh crocodiles and the Estuarine or Salt Water Crocodile, *Crocodylus porosus* (Schneider), bear a striking resemblance to one another, there was a mistaken impression that both are found in Goa.

Crocodile basking at Cumbarjua



Manoj Borkar

Crocodiles have been found in Goa at least since 1500 A.D. when the first written reference to them is found in a Portuguese document. Some tribes and communities are reported to worship the crocodile.

The crocodiles are found mainly in the Cumbarjua canal, which connects the Zuari river with the Mandovi. They are occasionally to be seen in the Mandovi and Zuari rivers as well till quite far upstream, but their clear preference is for the canal. The crocodiles can tolerate high salinity as well as near fresh water conditions, which is necessary as the salinity of the canal varies between 0.5% to 36% depending on the tides and seasons. The existence and well-being of the crocodiles seems to be directly tied up to that of the mangroves as the mangrove vegetation comprises their primary habitat.

Fishermen have a dislike for crocodiles as they feel that the crocodile compete for the fish. This is a myth. The crocodiles feed on coarser variety of fish and perform a vital role as scavengers in the Cumbarjua canal, where large quantities of dead and decaying sea food are dumped. Young ones feed primarily on insects, young crustaceans and frogs. Attacks on human beings are rare and are occasioned more by circumstance than design.

Crocodiles are oviparous reptiles that lay eggs. They bury them in nests constructed in the soil. The study in 1993 estimated that the canal harbours about 14 adult reproductive animals. No current estimates are available, but it is known that the population has undergone a substantial increase, with natural growth and the release of seized animals into the canal.

There were a number of unfortunate examples of captive animals having been kept for display. These creatures were in miserable shape. The animals are often tied by ropes that cut into their skin, not fed properly and are the victims of teasing and pranks by youngsters.

There was a case of a captive crocodile in a temple pond which was stoned to death by a group of youth. Unfortunately, poaching of the creatures still takes place though no exact figures are available. Borkar et al. report that a 7ft. long animal was captured and killed and then auctioned off for Rs 10,000/- for its meat and skin. Crocodiles accidentally caught in nets are routinely killed. Conservation efforts need to be stepped up further to protect this magnificent animal.

A number of young wildlife lovers and naturalists have been actively involved in the efforts to seize captive crocodiles and release them into the wild. You can find more details about them under the entry, 'Southern Birdwing' in chapter 12.

Tailpiece: A Day at the Beach

This piece is taken from Goa Remembered, the classic book on Goan life-styles, habits and manners by Antonio Pereira. (You can order it from Other India Bookstore)

Vareac Vochonco (Change of Air) — During the children's May vacation, the old folks prepared themselves for a short holiday of a week or two at the seaside. It was customary to take annually a few sea-baths for fitness against such maladies as rheumatism, skin trouble, and what not. So the custom was called *Mudansaco* or *Vareac vochonco*. The people of Bardez went to Calangute, Baga and Vagator. There were no hotels or guest houses. Fisher-folk rented their houses, which were in demand in the season and booked in advance by the rich. For cheaper accommodation temporary *mathous* (pandals) were erected. All places adjoining the beach were converted into picnickers' resorts. Thus people from all levels of life, rich and poor were able to enjoy a summer holiday by the sea. Every bit of beach became a picnickers' resort.

People would take their utensils and provisions and cook their own food. Early in the morning the fishermen would drag in the *rampon* (fishing net), and the holiday makers crowded around to watch the silvery fish leap desperately inside the net on the lacy borders of the waves. People could buy cheaply fresh fish of all varieties. In the afternoons and nights, there was a delicious aroma of food, *feni* and *urrac* in the air. At nightfall there was soft music all along the beaches, and relaxed groups singing accompanied by guitar, mandolin, mouth organ or accordion—scenes so distinctively typical of Goa.

The beaches then were wide and shaded by countless coconut palms swaying in the sea breezes. One had to walk a long way over the warm, golden sands to reach the vast sheet of

aquamarine waters of the Arabian Sea. Today these lovely golden sand dunes are no more. Hotels and commercial and municipal establishments dot the shore and the wide beach has been to a narrow, litter covered rag of dirty grey muddy sand.

Calangute Beach—Calangute beach then stretched uncluttered and uninterrupted for 7 kms from Baga to Sinquerim. It was the most popular of Goa's beaches. All though the year people came to it on evenings, and crowded it at the weekend—children building castles in the wet sand or picking shells on the edge of the sea, courting couples walking hand in hand, totally absorbed in each other, married people, families, old people burying their rheumatic legs in the sand, groups of young people with *gumot* and mandolin singing the age old *mandos*, *durpados* and *fados*, and even the old people joining in with the singing. The *bojecar's* stall on the beach was always crowded, for *garam bajas* was the only snack Goans patronised from outdoor vendors.

When finally the red sun sank in the golden sea, darkness fell suddenly, and the people hurried to go home. Many on the way would stop at bars and restaurants to quench their thirst with cold beer, hot drinks, soft drinks and snacks.

At weekends there would be a dance on the beach under the stars or the golden moon. On the following Sunday one would hear the village chaplain shouting from the *Cadeira de Instrucao* 'Scandal, scandal... on the beaches of Calangute.' Old people struck their breasts in penitence saying, '*Bogos saiba*.'

Summer Months—The months of April and May were not only the time for festivities. They also were the busiest months of the year, especially for the housewife—for stocks had to be laid in and preparations made for the harsh siege of the

rains. When the monsoon broke, the incessant rain of the first few days cut off all outdoor activity, and one household from another by swollen streams and flooded roads.

I vividly recall after all these years the hurry and excitement of the months just before the rains. There was a constant bustle about the house in stocking firewood, food stuff, a variety of other provisions, and a large quantity of common salt.

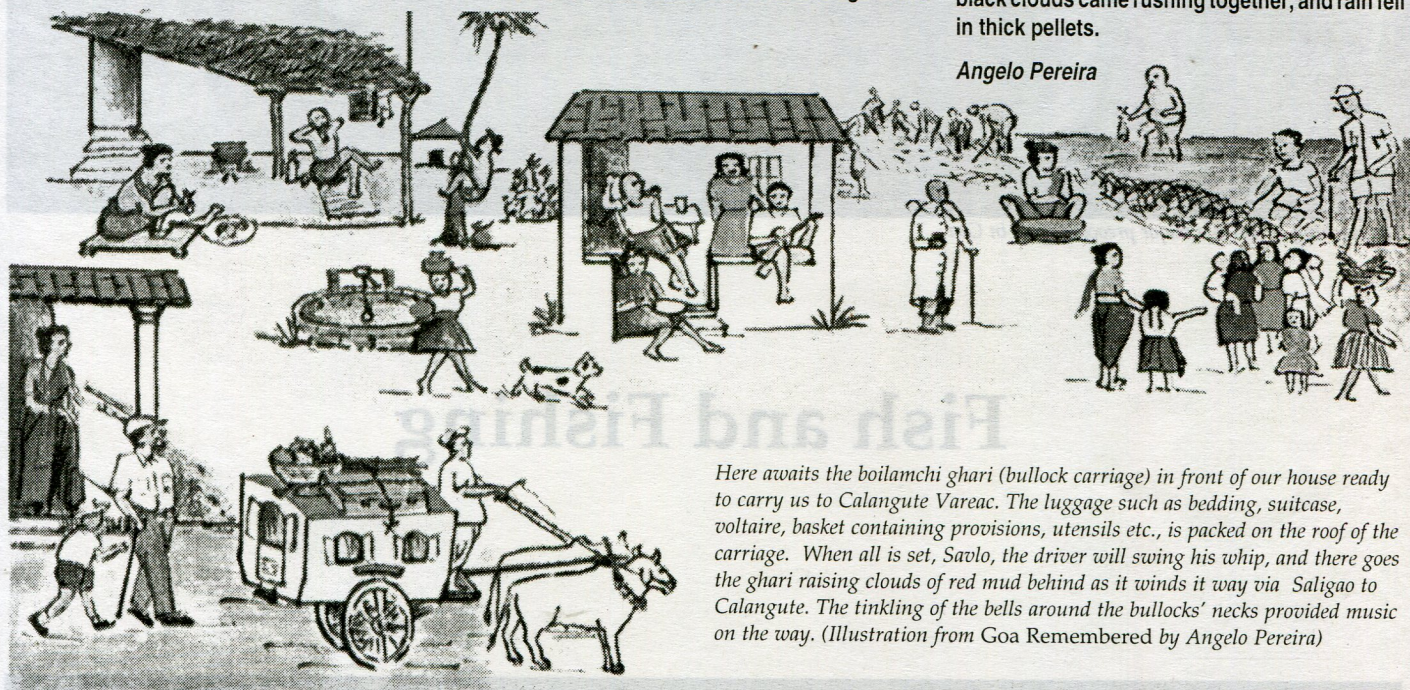
Coal and gas were unheard of in those days, and huge stocks of firewood and kindling had to be got. *Zolo* (big logs of wood) was brought from Mapusa by cart. These logs were chopped small and stacked in the outhouse. *Kholieo* (dry leaves of mango, jack, and cashew trees) were packed in *zabro* and stored. *Kholieo* were used for boiling bathing water. *Xeni* (dry cakes of cowdung mixed with straw) were bought in hundreds and stored for use in cooking.

Food was the chief item of storage. Rice was stored in big *bah-ans* (mud pots). Moira chillies were dried and stocked in pots. Onions plaited in bundles with plantain hemp (*gabo*) were hung from big bamboo poles in the storeroom. Many condiments were dried and cured for storage. Pickles of all varieties—mango, cantam, bimblim, lime—were stored in jars and kept in the almirah of the fast filling storeroom. Fish also was cured, salted and dried—*bangre*, *conchudde*, *more*, *sungtam*, *viswon*, and of course, the stock would not be complete without *chourisos*, *parra* and *balchaum*.

Being on holidays, one of our jobs in those days was to keep watch on the various things put out to dry—paddy, *mirsango*, salted fish, *chourisam*, condiments and *khobrem*.

Then, suddenly, when the sultry spell had never seemed to end, the wind rose, lightning forked, black clouds came rushing together, and rain fell in thick pellets.

Angelo Pereira



Here awaits the boilamchi ghari (bullock carriage) in front of our house ready to carry us to Calangute Vareac. The luggage such as bedding, suitcase, voltaire, basket containing provisions, utensils etc., is packed on the roof of the carriage. When all is set, Savlo, the driver will swing his whip, and there goes the ghari raising clouds of red mud behind as it winds its way via Saligao to Calangute. The tinkling of the bells around the bullocks' necks provided music on the way. (Illustration from Goa Remembered by Angelo Pereira)



Along the coast, two human communities—the fisherfolk and the toddy tappers—maintain and exploit niches for survival as zealously as birds do in the mangroves. Their very survival, however, is threatened by the active degradation of this region and by the endorsement and encouragement of unsustainable fishing policies.

We treat the sea as an inexhaustible resource, whose bounty will forever continue to feed us, irrespective of its over-exploitation, maltreatment and abuse. In Goa, we are facing the immediate and long-term consequences of ecologically damaging actions. In the open seas, the insane rush to fish intensively, extensively, without time limits is



The catching of fish is a major preoccupation in Goa

Fish and Fishing

killing the sustainable use of our fish. Of this, there is no doubt at all. In this sense, human beings are profound idiots, even when they seek to pass themselves off as capitalists. Fisheries have collapsed through overfishing all across the planet. We never learn. We go through the same process. We welcome the deprivation that always accompanies destruction of sustainable resources.

The key issue is this: will we give the fish the time to breed, sustain their populations and multiply, or will we pursue the present policy of mass killing of pregnant fish and juveniles, dictated by commercial lobbies with a toothless government only too anxious to protect them?

In the coastal area crammed with creeks and tidal rivers, we face another serious problem. The pollution has reached such alarming limits that it is destroying aquaculture as well.

Do we think we are the last generation on this planet? A good question to ask ourselves. Our kids might be curious to have the answers.

AN INTRODUCTION

Fish forms an integral part of Goan life. With a 105 km long coastline and 40,000 to 50,000 people being dependent on fish harvesting for a living, it would be difficult to overstate the importance of this commodity in either the Goan economy or diet.

Walk into any restaurant and half the menu is composed of sea food. Visit any Goan family at lunch and you are served fish curry. Travel in many a bus in Goa and your nostrils are assailed by the smell of fish being transported to the market or being carried home.

The most popular fish in Goa is definitely the mackerel, followed by the sardine. Mackerel and sardine account for almost 70 per cent of the oceanic catch and their availability is usually inversely related. Other popular species are kingfish and pomfret, though these are not consumed as much as elsewhere on the Konkan coast (particularly around Mumbai), due to lower availability and higher prices. Then there are a number of other fish like shark, catfish and low value small fish which were earlier avoided or used as fertiliser. Now, due to short-

ages of good fish, induced by the demand from tourists who are willing to pay any price for it, even 'trash' fish has acquired food value. In fact, even the small restaurants nowadays rarely succeed in buying good fish: it has become just too expensive.

Big prawns, crabs and lobsters were also once very popular, but with most such catches being reserved for export and the five-star tourist trade, their availability in the open market has diminished to a level at which most Goans are seriously deprived of them.

But the dependency on the sea and its produce remains unbroken.

During the monsoon period, when fish is really scarce, hordes of Goans roam the markets, inspecting the small quantities placed on display, and wearing mournful looks as they listen to the outrageous prices. Liberation from a fishless existence comes only when the monsoons withdraw and the boats can get out to sea again.

Besides the sea, other sources of fish are the inland rivers and the riverine estuaries. In Goa, relatively little fresh water fish is eaten. But traditional aquaculture (in saline water) has been practiced for centuries now, particularly in the *khazan* lands. These days there is a move to utilise these lands strictly for prawn culture, all of which produce will be exported, thus depriving the local population of one more source of fish.

Pulses and vegetables, which supply most of the protein requirements of the inland population, are missing in the Goan diet. Vegetables are eaten but in a very small quantity—certainly not enough to supply any significant protein. Animal protein required by the human body is supplied largely by fish. Milk consumption is minimal.

An adult requires approximately 45 to 70 grams of protein a day. The table below gives the protein content of fish popularly consumed in Goa.

Approximately 40,000 people (12,000 active fishermen and their families) are dependent on fishing for their livelihood. They have faced serious threats of displacement by mechanised fishing—the same process that has driven the fisherfolk of Kerala to destitution is being replicated in Goa.

The fisherwoman is one of Goa's familiar sights. The practice in most Goan fisherfolk families is for the husband to go out fishing and for the wife to take the produce to the market.



Protein content of fish

Name of edible Fish	Protein (per 100 gm portion)
Mackerel (Bangda)	18.9
Sardine (Pedve) low fat	21.0
Sardine (Tarle) high fat	20.5
Small Prawn (Sungta)	19.1
Crabs	11.2

(Source: Nutritive Value of Indian Foods; N.I.N., Hyderabad)

There are, in addition, a number of subsidiary activities which have grown around fish harvesting. One of them is the preservation of fish. This has traditionally been a household industry. Delicious pickles and typical Goan products like the famous *balchao* and *para* are an extremely popular supplement to the daily meal. Another subsidiary occupation is that of net repair in which most members of the fisherfolk household must engage.

After Liberation, Goa inevitably got caught up in the process of 'development' which was being indiscriminately applied all over the country. This had a major impact on the whole fishing network in Goa. Increasing industrialisation has resulted in considerable marine pollution. There has been a massive increase in the

Traditional fisherfolk mending their nets.



number of mechanised fishing vessels, resulting in displacement of traditional fisherfolk. A major conflict over resources has arisen between the traditional fishermen and the owners of mechanised fishing vessels. A people's struggle has grown around the problems of traditional fishermen.

The market has been exposed to considerable commercialisation with more and more fish production being consumed by the export and tourism sectors. Traditional preservation methods are being replaced by cold storage facilities. Commercial interests have acquired a crucial monopoly over net manufacture—mechanisation in this area has resulted in a loss of livelihood for many people. Fish fertiliser having become unavailable, there is increasing dependence on synthetic fertiliser. This is a classic example of a situation where development, which claims to be for the benefit of the common people, is actually ruining them.

The implications of all these changes are far reaching and affect every facet of life in Goa. In particular, the ecological implications of fisheries development are profoundly disturbing. There seems to be, however, no adequate response on the part of the administration. The powers-that-be seem securely locked in the imported conundrums of the 'development' process.

MECHANISATION TRENDS

Blind transplantation of Western capital-intensive technology to aid India's 'development process' has by now become such a deep-rooted, irrational drive with both planners and the ruling elite that even the most persistent critics have given up in utter despair, no longer daring to hope that we will learn from the mistakes of the past. Western technology has been applied in India without taking due note of the special problems that India has, or attempting to understand the reasons behind the support given to this process by Western governments and economic interests (chiefly the multinationals) and institutions like the World Bank.

The mechanisation of the Indian fishing industry began with the inception of the Indo-Norwegian Project in Kerala in 1953. The stated motive was to improve the standard of living of the population in general (by increasing the fish catch and thereby the protein available to the people for consumption) and the economic condition of the poor fisherfolk in particular. The methods imported sought to increase not only production but also productivity by the use of modern equipment and technology. The hidden motive seems to have been the desire of the West to create a market for its fishing equipment and technology.

Detailed studies by social scientist John Kurien and his associates at the Centre for Development Studies (CDS) have shown the Indo-Norwegian project to be a total failure. Protein consumption in the project area actually declined, with a large part of the increased fish catch going for export.

However, the ideology of mechanisation is firmly enshrined in the gospels of Indian development policy—the five-year plans. The Fifth Five-Year Plan stated clearly that an increase in mechanised fishing vessels is the appropriate technology for increasing production. The Seventh Five-Year Plan sheepishly admitted that the goal of increased production was not achieved. In terms of making changes in sectoral outlays, however, there was no difference between these two plans. There is some lip-service paid to the problems of the traditional fishermen, but practically no sectoral outlays towards alleviating their problems.

Ecologically, mechanised fishing is disastrous. Even in economic terms, it is not a proposition that the wise investor will back. Consider for example, what P.S.B.R. James of the Central Marine Fisheries Research Institute (CMFRI) wrote: 'The return per unit of investment of non-powered boats has been found to be twice that of the powered boats and the former generate almost seven times more direct employment opportunities than the mechanised boats.'

In fact, the only reason that the mechanisation process has continued is the massive government subsidy, aid and loans to mechanised fishing. Many of these loans have already been written off. The Goa Government officially declared the years 1980-1982 a 'fish famine' period in the Gazette (even though the fish catch was not alarmingly low), in order that the loans due from fisheries (trawlers) cooperatives could be waived for a period of time. Twenty years later, the government has yet to

The Agitation of the *Ramponkars*

The struggle of the traditional fishermen of Goa, spearheaded by the Goenchea Ramponkarancha Ekvott (Beach-Net Fishermen's Union—GRE), is a classic example of a struggle, based essentially on economic issues, which has also addressed ecological problems.

In the conflict over marine resources which emerged between traditional fishermen and the owners of mechanised fishing vessels, the former soon realised that the marine ecosystem itself was under threat from mechanised fishing. What at first glance appeared to be a purely economic conflict had, therefore, much deeper implications.

Thus, the anti-trawler agitation gradually developed into a struggle of the common people for control over a resource which had provided them with a livelihood for centuries. The group that led the *ramponkar* movement in Goa was composed of individuals linked by a common desire to respond to the needs and problems of the traditional Goan fishermen—one of the unprivileged sections of Goan society—and restore to them their rights and control over marine resources. They saw this as necessary to improve life in Goa, because they felt that the mechanised fishing industry has its eye only on profit-maximisation and is not in the least concerned about the welfare of Goa and the Goans.

For some time in the mid-70s, the *ramponkars* had been facing a growing threat from trawlers which were wont to destroy their fishing equipment. At this point in time, the problem of dwindling catches by the traditional sector, thanks to increases in mechanised fishing, had just surfaced, although it had not yet become acute. In the course of the anti-Zuari Agro Chemicals agitation, a number of fishermen approached Mr. Matanhy Saldanha with their grievances. But it was only around the end of 1977 that an all-out struggle began and the GRE was formed to represent the traditional fishermen.

The battle lines initially appeared to be clearly drawn, for the issue seemed essentially economic. There was a section of Goa's traditional communities involved in shore seine fishing, now faced with a frontal attack on their livelihood by the mechanised boats, privately owned by a class of *nouveau riche* businessmen with economic power and political contacts, backed by the miscegenated 'development' ideology of the ruling classes. A simple case of the powerful depriving the underdog; the rich were eating into the livelihood of the traditional fishermen.

But gradually a number of other issues began to surface. It was noticed that not only was the *ramponkars'* catch diminishing, but the total landings were fluctuating wildly. And there had been no significant overall increases in the catch as should have been the case after such large scale investment and induction of the 'super-efficient' technology.



Traditional fisherwoman with catch

By 1978, it was clear that if prevailing trends continued, Goa's fisheries would go the way of the Peruvian, Atlantic and North Sea fishing industries—ruined by depletion of fish resources caused by mechanised overfishing. It thus became obvious that ecological issues would also have to be tackled. The *ramponkars'* fishing methods are kind to the delicate marine ecosystem and do not overstrain it. But mechanised fishing was an entirely different case.

Goa was then a place where people were not familiar with methods of agitation. In this environment, the GRE took up many novel forms of protest which were quite effective. Relay hunger strikes came to Goa through GRE: it organised two major relay hunger strikes of around a year each in duration, one in 1980-81 and another in 1985-86. Processions of between two and three thousand people were taken out on numerous occasions.

The *ramponkars* had begun to constitute an important political force and they promised to throw their weight behind any political party which would ensure that a law regulating mechanised fishing would be enacted. Some uneasy alliances were forged, but the *ramponkars* were betrayed. Finally, in 1980, the Congress (Urs faction) made an election promise to introduce the required Bill. The *ramponkars* therefore supported this party, which was elected to power in the 1980 election.

No Bill materialised until 1981. Then too, it was only after certain important changes had been made in it at the behest of the interests supporting mechanised fishing: the 20 km limit for trawlers was reduced to five km; the provision banning night fishing by trawlers was removed; the power to hold summary trials was transferred from the Executive to the Judiciary, a move calculated to ensure interminable delays of hearings, given the backlog-jammed state of the Indian Judiciary; and last, but not least, there was no regulation of the mesh-size of nets to be used for fishing. All this in direct contravention of the Majumdar Committee recommendations and the

draft Bill circulated by the Central Government. Yet even this much weakened Bill was challenged by the trawler owners in a writ petition before the Supreme Court, which placed a temporary ban on mechanised fishing within 2 km of the coast.

The GRE's main contentions—with far-reaching implications for ecology—have been that the sea is a resource which the *ramponkars* are dependent upon and which they exploit in harmony with the environment. Mechanised fishing, on the other hand, is ecologically harmful and will result in depletion of fish resources. Also, in a labour-surplus economy like India, traditional *rampon* fishing makes far more sense than capital intensive mechanised fishing. Finally, it is *rampon* fishing which in the long run will result in increased catches—the ceiling for trawlers has already been passed. Thus, one could summarise the GRE's arguments as being based on three grounds: ecological, technological and economic.

Today, however, the struggle has hit a slack, 'almost extinct' period. This is something that is depressing from an ecological standpoint, and it is necessary to make an attempt to understand why this is so. One is that there are a number of class contradictions within the *ramponkar* community itself. Not all *ramponkars* are owner-fishermen: a large number operate on a wage or catch-share basis. This leads to certain tensions within the community itself. Further, there is a section of *ramponkars* which nurses hopes of joining the trawler-owner class with the aid of loans.

Government Indifference—Anybody concerned about the State of Goa's environment could only hope that the *ramponkars'* struggle resumes and that the *ramponkars* succeed in getting the government to implement its regulations on mechanised fishing. Even in this area, the government has done nothing and in 1985, the resultant situation led to armed clashes between the trawler owners and the fishermen, especially when trawler owners indulged in monsoon fishing, openly flouting—besides the law—all ecological considerations. The Government responsible for implementing the law watched indifferently while it was broken, only waking up to send its policemen to suppress a demonstration by the *ramponkars* when the law and order situation was threatened.

Whatever the weaknesses of the *ramponkar* movement, it is the only hope that exists of averting a marine resource ecological disaster. Ecologists have been warning that the coast is being polluted and overfished—to no avail. The government has brought in legislation—again useless. It is time for the people to take control of their environment and to demonstrate how we can hope once again to live with it harmoniously.

learn its lesson. For many years, the government engaged in churning out dubious statistics which at first glance seemed to suggest increasing fish yields. But an examination of the trend of fish catches over the past five years shows the real position.

Not that the politicians really care. Mechanisation gives them the opportunity to distribute subsidies to their cronies and strengthen their support base.

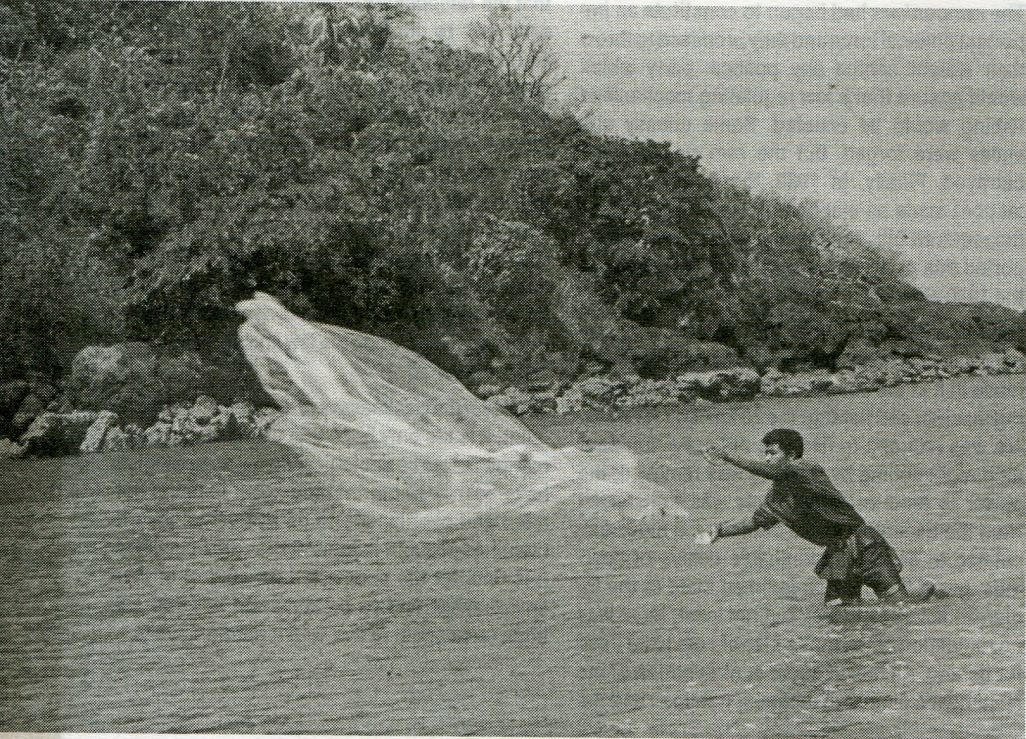
Resource Depletion — The relatively flat figures for annual catches over two decades, naturally, raise the spectre of 'fish famine' stemming from unabated marine resource depletion.

It is argued with some justification that 'natural factors' play a role in determining marine stocks. For instance, periodic changes in ocean currents and water temperatures, the oxygen content, etc. all result in resource fluctuation. But history testifies that these changes tend to 'even out' over a period of time and the Goan experience over the years under review would seem to reinforce this.

It is also true that marine pollution affects resources adversely. The dumping of industrial effluents and wastes, mining rejects, unprocessed sewage and toxic materials causes substantial damage. And scientific studies carried out in Goa's waters (see sub-section on pollution) provide evidence that the estuarine spawning grounds are under cognisable threat. Yet, at this stage in time, the overall effect of pollution on fish catches (except clams) may be considered marginal.

All things taken into account, it would appear that the ill-advised adoption of supposedly 'modern technology' is the major cause of problems plaguing Goa's fishing industry today. More precisely, the deployment of this technology to exploit marine resources beyond sustainable limits has resulted in their steady depletion, almost to a point from which a healthy recovery could only be miraculous. Scientific opinion buttresses the fear.

Traditional fisherman trapping fish in the river



Parulekar and Dalal (1979) estimated that the maximum sustainable yield (MSY) of the marine fisheries off the coast of Goa is 70,295 tonnes per annum—41,760 tonnes 'pelagic' and 28,535 tonnes 'demersal'. (The estimate is subject to natural variations.) On the basis of this study, 60,000 tonnes per annum would be the maximum harvestable yield. As against this, the annual fish landings have been hovering around the 40,000 tonnes mark for the past few years, if one ignores the suspect spurt since 1990.

On the face of it, therefore, it would seem that the marine resources of Goa are underexploited, that the policy of increasing mechanised fishing is sound and justified and that the demands of the traditional fishermen for conserving fish resources are premature and irrelevant. But things are rarely quite that simple.

The MSY, as calculated by Parulekar and Dalal, refers to all fishery resources off the coast of Goa, including the deep sea. And Goa's catches are all fairly close to shore.

One can divide the entire fishing area into three sectors:

1. the area between 0-10 m depth, reserved for the traditional fisherman;
2. the 10-15 m, depth zone which can be exploited by the existing trawlers and purse-seiners; and,
3. the area marked for deep sea fishing.

While the first two sectors are not exactly contiguous with the two km fishing zone in force in Goa, there is a rough correspondence. The major problem is that it is essentially sector one which is being viciously over-exploited, to the detriment of the local ecology. The traditional fishermen in their mechanised (Out Board Motor) and non-mechanised country craft (about 3000 in number) cannot venture very far out to sea; so in their case, fishing close to shore is perfectly justified. And legal. What about the trawlers?

The main argument against increasing the number of trawlers and purse-seiners is that they are not the appropriate technology form for optimising fish yield. There are now about 850 trawlers and there is no conceivable way in which such a large number of vessels can be supported by a coast 105 km in length.

The standard rule of thumb, internationally in use, is 30 trawlers per 10 km of coastline, by which calculation Goa can support a little over 300 trawlers. But even this is a wildly misleading estimate. Most of the trawlers are less than 40 ft overall length (OAL) and cannot stay out at sea for a period longer than 24 hours. Obviously, they cannot exploit deep sea resources. Assuming that, therefore, they fish from depths 10-15 m, the area available just cannot support such a large number of trawlers, and overfishing is inevitable.

Types of Fishing Craft

A: Mechanised	1977*	1982*	1987*	1992+	1997++
i. Gill Netters (OBM)	61	251	233	-	460
ii. Liners	54	36	1	900	-
iii. Others (Seiners, Canoes)	104	21	474	-	601
iv. Trawlers	91	282	193	850	255
Total	310	590	801	1750	1324

B: Non-Mechanised

i. Beach Seiners	362	134	-	-	-
ii. Plank-Built Boats	611	752	406	2000	74
iii. Dugouts and others	1465	1319	1208	-	792
Total	2438	2205	1614	2000	866

* Census of livestock and farm equipment, 1987, Government of Goa.
 + Directorate of Fisheries, March 1993.
 ++ Statistical Pocket Handbook, 1991, Government of Goa.

To survive, they break the law and flout ecological considerations and fish in waters reserved for traditional fishermen. When fishing in shallow waters, trawler boards dredge the sea bed, destroy fish eggs and nutrients and disturb fish movements generally. Worse, they attempt to fish even during the monsoon (fish breeding) season, a practice which is ecologically unsound and dangerous, leading to depletion of resources and conflicts with traditional fishermen.

The ceiling on mechanised fishing was overshot a long time ago. A vastly increased number of trawlers (2 in 1961, 10 in 1965, 91 in 1977 and about 850 today) chase roughly the same amount of fish and trespass into areas reserved for traditional fishermen. The law of diminishing returns has begun to make itself felt. The total fish catch has increased but the return per person/hour spent on fishing has dropped sharply.

The monsoon fishing ban — There is overwhelming and irrefutable data to indicate that a monsoon ban on mechanised fishing is necessary along the entire West coast, as this is the breeding season for most of the fish. The states along the West Coast have by and large recognised this need and imposed bans for the early months of the monsoon; in the adjoining state of Maharashtra, the ban extends from mid-June to 15th August; in Karnataka, from June 1st to 31st August.

Aware of the need for measures to conserve fish and regulate fishing, the Goa Government issued a notification dated 15.2.1995 prohibiting mechanised fishing from 1st June till 31st August. But barely 4 months later (on 17th July, 1995), bowing to 'economic considerations' (read pressure from the trawler lobby), the ban period was unceremoniously reduced to 24th July by another notification. The government later stated that the ban period was reduced from 90 days to 54 days in view of representations received from the mechanised fishing vessel operators that the ban period was too harsh and would deprive the operators from generating earnings on assets acquired through loans from banks. The sorry results of this decision are reflected in the figures for catches recorded over the past five years, which show highly depleted catches in 1998 and 1999.

Finally, in June 2000, the Panjim Bench of the Bombay High Court admitted as a PIL a letter petition challenging this decision. After hearing the arguments and relying on data on fish spawning supplied by the National Institute

of Oceanography (see table), the High Court passed an order on 20th July 2000, imposing a complete ban on mechanised fishing in the territorial waters adjoining Goa until 15th August 2000.

But sanity was not to prevail so easily. The day after the order was issued, a Bill was moved and passed *unanimously* in the State Legislature, reducing the ban imposed by the Court from 15th August to 24th July. The bill also expressly prohibited the court from interfering in the matter.

This was unprecedented, even given the sorry history of goings-on in legislative chambers in Goa and the rest of the country. Flying in the face of all established legislative practice, a bill introduced in the morning was passed by the afternoon; when the members had time to read and apply their minds to the subject matter of the bill is a moot question. And this was a private member's bill, not a government bill! Our worthy legislators showed, if any further proof were needed, exactly which side they stand on when it comes to equity and sustainability. There was not a single dissenting voice. Not only did they think fit to destroy the future of Goan fisheries, the legislation even sought to bar the courts from interfering, in complete violation of every principle of separation of powers between the various wings of government.

Fortunately, the abdication of responsible behaviour by the legislative wing received a stinging rap when the Governor returned the bill unsigned to the Assembly. Meanwhile, the flood of negative criticism was putting the Government in an uncomfortable position; it was also obvious that the judiciary was unlikely to be amused. The bill was allowed to lapse.

But the damage had already been done. The bill had been given wide publicity. Trawler owners waiting for the opportunity, assuming that the ban expired on 24th July—and set out to sea. *Post-facto* the court passed directions like sealing the jetties and suspending the licenses of the trawler owners, but it was much like closing the stable door after the horses had bolted.

Thereafter, the High Court admitted the writ petition and granted an interim injunction against any fishing by mechanised vessels till August 15 each year till the final disposal of the petition.

FISHING AND POLLUTION

Demonstrating concern for the environment has become fashionable enough to be sometimes taken to ludicrous extents. Perhaps none more so than that taken by the former Lieutenant Governor, the late Gopal Singh. On a visit to the world famous Calangute-Baga beach in 1985, he was 'appalled' by the sight of traditional fishing craft and nets on the golden sands. They were a hindrance to the tourists and 'polluted' the pristine seashore, he thought. So, unmindful (or ignorant) of centuries-old practice, the learned Dr. Singh ordered the beach cleared of all boats and nets!

Vociferous popular protest forced a hasty retreat by the Lieutenant Governor to the ivory tower of his Raj Bhavan. But the traditional fishermen are not always that lucky. As the beaches are swamped by tourists and hotels, they are often cajoled and browbeaten into relocating their boats and nets.

Yet it is not as if the mechanised fishing industry today does not create pollution. With the modern 'mass production' technology having been recklessly adopted, many activities which were harmless earlier have become a positive nuisance and health hazard.

Fish drying is one such case. In years gone by, fish was dried for monsoon fare, in small quantities, spread out in batches along the beaches. Today, tonnes of unmarketable waste fish are dried, primarily for disposal as

manure. Whole plateaus are usurped for the purpose. And newspapers regularly report public outrage in places like Old Goa, Verna, Cortalim, Chapora, Benaulim and Arambol about the stink and the threat from the disease-carrying blue bottle fly.

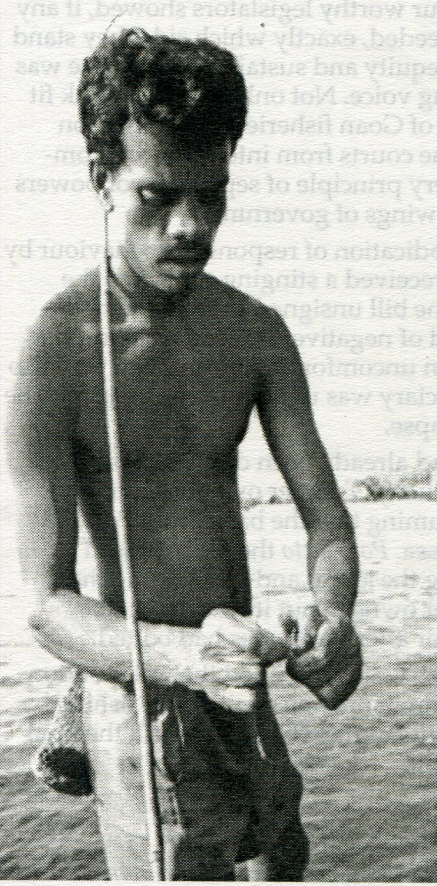
Then again, catches that cannot be sold are nonchalantly dumped in the rivers and creeks and off fish wharves. Obnoxious odours are, of course, an inevitable result. And rotting carcasses washed ashore are, like the tonnes of drying fish, cause for genuine concern.

Trawler harvests have encouraged the setting-up of canning factories. These pollute the environment considerably, especially with waste discharge. The two plants at Corlim and Chapora are notorious for this. The Chapora shrimp processing plant has a particularly bad reputation. Discharges of waste materials have resulted in the Chapora lake becoming polluted. The once abundant fish and crab life have moved away, threatening the livelihood of a number of local fishermen.

Unfortunately, whilst the mass drying and dumping of fish continues, as does the waste discharge from an increasing number of canning factories, nobody seems to think some fish meal plants would help reduce pollution.

Industrial Pollution — If there is sharply increased industrial activity in waterbound Goa, can marine pollution be far behind? The infamous case of Zuari Agro Chemicals Limited causing mass fish mortality by discharging arsenic-laced effluents in the mid-seventies is now part of Goan pollution folklore. But studies con-

Fisherman preparing his tackle



Breeding Periods of Important Locally Consumed Fish

No.	Species	Konkani Name	Breeding Period											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.	Pomfret	Pamplet					•	•			•	•	•	
2.	Prawn	Sungott		•	•	•						•	•	•
3.	Jewfish	Corcoro /Folleo						•	•					
4.	Butterfish	-		•	•	•								
5.	Catfish	Sangott									•	•	•	•
6.	Gholfish	-								•	•	•	•	•
7.	Halibut	-									•	•	•	•
8.	Dhoma (J.D.)	Dhoddiaro						•	•	•	•	•	•	•
	Dhoma (J.M.)	Dhoddiaro						•	•	•	•	•	•	•
	Dhoma (J.G.)	Dhoddiaro	•	•	•	•	•				•	•	•	•
9.	Croaker (J.V.)	Foddki						•	•				•	•
	Croaker (O.C.)	Foddki					•	•	•	•	•	•	•	•
10.	Seacrab	Kurli		•	•	•	•							
11.	Indian Mackerel	Bangdde					•	•	•	•	•	•	•	•
12.	Sardine	Tarle					•	•	•	•				

Quantities of different species of fish harvested in Goa

Common Name	Scientific Name	1995	1996	1997	1998	1999	Average
Indian Mackerel	<i>R. Kanagurta</i>	42712	44254	21721	19663	19240	29518
Horse Mackerel	<i>Megalopsis cardyla</i>	—	—	331	156	67	111
Oil Sardine	<i>S. longiceps</i>	79	1499	5640	9508	17505	6846
White Sardine	<i>K. coval</i>	—	321	1341	639	510	567
Lesser Sardine (Pedve)	<i>Dussumaria acuta S. fi</i>	1579	1962	11480	9022	3792	5567
Wolf herring/Silver bar	<i>Chirocentrus dorab</i>	143	—	328	372	183	205
Seer fish	<i>S. commerson</i>	917	859	1143	1272	914	1021
Ribbon fish	<i>T. Lepturus</i>	2181	3838	3720	2583	145	2493
Anchovy	<i>C. dussumeri</i>	—	—	67	18	60	29
Tuna/Other tuna species	<i>E. affinis</i>	—	303	106	22	27	92
Half beaks	<i>H. lutheri</i>	—	—	1	16	14	6
Round scad	<i>Decapterus sp</i>	—	—	—	747	506	250
Silver Pomfret	<i>P. argentus</i>	—	—	—	—	—	—
Chinese Pomfret	<i>P. chinensis</i>	1105	549	1191	524	371	748
Black Pomfret	<i>P. Niger</i>	—	—	—	—	—	—
Soles	<i>Cynoglossis macrostom</i>	3498	1326	2838	1813	1311	2157
Thread fins	<i>E. telra-datylum</i>	—	56	86	17	29	38
Reef cod	<i>E. malabaricus/ . tau</i>	778	2999	963	502	22	1053
Cat fish	<i>A. caelatus/A. thalas-s</i>	1710	151	684	650	723	784
Shark	<i>S. laticaudus</i>	25	501	964	583	426	500
White fish	<i>L. lactarius</i>	—	—	793	651	840	457
Goat fish	<i>Upeneus sp.</i>	—	2098	4648	864	404	1603
Thread fin breams	<i>N. japonicus</i>	—	—	—	—	—	—
Croakers Ghol Koth Oth	<i>a. Putonibea diacanthus</i>	1106	1511	4150	3529	2963	2652
Miscellaneous species		11234	18571	19165	8471	7495	12987
White Prawn	<i>a. P. indicus</i>	—	—	—	—	—	—
Tiger/Tiny	<i>b. P. monodon/</i>	—	—	—	—	—	—
	<i>c. P. se</i>	5193	4585	4174	2651	1622	3644
Lobster	<i>Panulirus plyphagus/ T</i>	1	10	6	2	—	4
Sea crabs	<i>Portunus pelagicus/ Ch</i>	480	35	578	799	426	464
Cuttle fish	<i>Loligo duvarceli</i>	1649	1200	5159	2162	480	2130
Squids	<i>Sepia pharonis</i>	1467	6109	—	—	—	2715
TOTAL		81856	92737	91277	67236	60075	78636

*Miscellaneous species include saurida tumbil, big eyed illisha, Tardore, Ambassis, Other fin fishes, white bait, Leather jacket, silver belly, other carangids, etc.

ducted more recently are sufficient cause for genuine alarm about the future.

As far back as in 1982, a National Institute of Oceanography (NIO) team comprising S Y S Singbal, M D George, R S Topgi and R Noronha reported substantial levels of heavy metals in several species of fish in the Aguada bay at the mouth of the Mandovi river. The study conducted between October and December 1978 indicated presence of iron, manganese, nickel, cobalt, zinc, and even mercury in the fish, most of which are table varieties, popular among Goans.

The extent of contamination is documented in the table given on page 181.

Obviously, most worrying were the levels of cobalt and mercury. The latter was found at almost the full toxic

level in the popular sardine and ribbon fish, yet rang no alarm bells. Cobalt was found at around half the toxic level in the equally popular mackerel and Indian herring.

No studies have been conducted since. But Goans can only shudder to imagine that this was the situation 20 years ago and could be much worse today. Minamata, here we come?

Several NIO studies have also shown that shellfish which are immensely popular among common Goans are under very serious threat, their natural environment being buried under tonnes of ore rejects.

One study established a steep deterioration in estuarine resources of clams (*tisreo*), mussels (*shinaneo*) and oysters (*kalvam*) between 1973 and 1983. It was found that during the decade in question, oxygen in the clam bed

environment was depleted by 67 per cent, clam production fell by 70 per cent and resident fauna became nearly extinct.

Another study conducted in February 1986 by NIO's Chandralata Raghukumar and Vijay Lande showed rampant disease and death among rock oysters in estuarine bays and beach areas. Significantly, this is the first documentation of shell disease among oysters in Indian waters.

The 1986 shell collection exhibited fungal growth in rock oyster shells, manifest as black flecks and raised white nodules on the inner surfaces. The report identifies the fungus as *Ostracoblabe implexa*, infecting the oysters for the first recorded time, thereby extending the known host range of this fungus. As rock oysters always occur in clusters, mass infestation by the fungus is inevitable.

Another study entitled *Fungal parasites of marine green algae Cladophora and Rhizoclonium*, by Chandralata Raghukumar (Botanica Marina Vol. XXIX, pg. 289-297, 1986) reported rock oyster diseases caused by three fungal parasites in the green algal genus *Cladophora* from Goan beaches. The maximum occurrence of these fungi was found between July and September. It was also observed that the maximum growth of all species of *Cladophora* was during the monsoon months, viz June-September, whilst only very scanty growth occurred between December and May. It was concluded that, during the monsoon, salinity drops and the terrestrial run-off, bringing in the influx of phosphates and nitrates (from fertiliser runoff), promotes the growth of *Cladophora*.

Numerous field workers have reported the growth of *Cladophora* to nuisance proportions in estuaries and on beaches and a search for a fungus as a biological control agent was carried out by some of them. Naturally occurring algal parasites like *O. rostriferum* and *Labyrinthula* which cause total destruction of *Cladophora* and *Rhizoclonium* could be used for biological control of these algae. But it stands to reason that we can stop use of

nitritic and phosphatic fertilisers to control growth of the destructive fungi.

Window pane oysters *Placuna placenta*(L) were, as their name suggests, till recently commonly used in Goa for window panes. Many traditional Goan bungalows have the shells of these oysters embedded between wooden slats for windows.

The window pane oysters occur buried in mud in the subtidal zone in the Zuari estuary. Shells of dead animals are washed ashore and are found distributed in the low to high tide areas in the intertidal zone.

The shells at the low tide water mark are heavily infested with shell boring green algae and cyanobacteria. The black coloration in the oyster shells is due to the presence of iron, its accumulation brought about by the associated shell-boring cyanobacteria.

Bleak Future — The foregoing discussion underscores the fact that overfishing in the near shore waters and unchecked marine pollution are major threats to Goa's 'fish-curry-and-rice' ethos—an ethos that has developed over centuries in total harmony with the environment. It is a tragic commentary on our times that over the last three decades elected governments have not only failed to check these threats but have been actively associated with compounding them. And as several cases of public interest litigation have shown, the State Government considers it an infringement of its rights if the Central Government introduces laws to control pollution. Indeed, there has been a systematic attempt to sabotage such laws and reduce the anti-pollution measures to a farce.

It appears that only a sustained public awareness campaign by non-governmental groups and organisations, will bring people alive to these problems and create the kind of opinion that will force politicians to act in the public interest—to ensure that future generations of Goans can continue to have fish curry with their rice.

What are the other solutions to the problem?

The parameters are quite tricky: fish yield must be increased without resource depletion. This is in discordant counterpoint to the prevailing dictum: 'Increased fish yields at all costs'. Yet, as the foregoing has underscored, ignoring depletion can only be at the risk of continuously shrinking catches—and disembowelling of the Goan way of life.

The essential first step is obvious: a drastic reduction in the number of trawlers which are less than 40 ft OAL. After all, it is these, with their miscegenated technology and fraudulent claims to modern fishing practice, that have wreaked (and continue to wreak) the greatest havoc on Goa's marine resources. No more than 200 of these—instead of the present 850—would suffice to trawl the 10 to 15 m depth zone off Goa's coast.

Coastal villagers search for clams in the estuary



Presence of toxic heavy metals in fish

Scientific name	Common name	Mn	Fe	Co	Ni	Cu	Zn	Hg
<i>Parastromateus niger</i>	Black pomfret	ND	4.75	2.70	3.28	0.58	4.56	—
<i>Scomberomorus commersoni</i>	Seer fish	0.40	2.96	ND	1.30	0.21	8.18	0.18
<i>Rastelliger kanagurta</i>	Mackerel	ND	16.51	4.15	1.50	0.82	7.80	0.19
<i>Neothunnus macropterus</i>	Tuna	ND	5.58	2.38	2.23	0.55	4.56	—
<i>Carangedae malabarius</i>	Horse mackerel	—	16.0	ND	1.49	2.18	8.06	—
<i>Leiognathus splendens</i>	Silver bellies	2.89	9.12	3.07	ND	0.41	20.90	0.17
<i>Clupea illsha</i>	Indian herring	1.68	22.17	4.02	5.60	0.49	22.66	—
<i>Lactarius lactarius</i>	White fish	0.34	7.88	ND	5.55	0.27	6.11	—
<i>Thrissocles purava</i>	Ribbon fish	0.48	7.98	2.76	ND	ND	6.26	0.40
<i>Cynoglossus semifasciatus</i>	Malabar sole	3.82	9.07	3.63	3.28	0.31	10.58	—
<i>Thrissocles malabaricus</i>	Shad	1.25	17.66	3.30	1.56	0.08	7.37	0.21
<i>Kowala coval</i>	White sardine	2.18	ND	4.29	2.87	0.16	9.03	—
<i>Dussumieria acuta</i>	Rainbow sardine	0.25	7.24	2.74	ND	0.32	5.98	0.21
<i>Johnius dussumieri</i>	Sciaenides	0.32	9.36	1.86	2.69	0.86	4.44	—
<i>Hemirhamphus marginatus</i>	Halfbeak	0.80	16.60	3.43	1.66	0.36	22.0	—
<i>Sardinella fimbriata</i>	Sardine	2.59	2.21	2.78	ND	0.50	14.94	0.41
<i>Saurida timbil</i>	Lizard fish	ND	5.99	2.51	1.55	0.12	3.85	—
<i>Parapenaeopsis stylifera</i>	Prawn	ND	5.58	2.47	ND	0.34	3.20	—
<i>Rhinobatus granulatus</i>	Shark	0.26	12.41	ND	0.98	0.16	4.43	—
<i>Johnius sp.</i>	Sciaenides	0.71	3.27	3.69	0.49	0.40	5.15	—
<i>Tachysurus dussumieri</i>	Hard clam	—	—	—	—	—	—	0.23
<i>Raphia malabarica</i>	Cat fish (mussel)	—	—	—	—	—	—	0.12

Toxic levels: Cobalt (Co) - 10 ppm; Mercury (Hg) - 0.5 ppm

*Singbal et al, 1978

The question, of course, is how to rid Goa of the trawlers, particularly given that their owners' lobby is one of the most powerful in the State (it includes several MLAs), and that millions of rupees have been invested. It goes without saying that primary would be a blanket withdrawal of all subsidies and concessions to trawler owners. And then, a partial answer lies in the fact that the craft are white elephants, unremittingly incurring loan capital and interest debts. An active campaign to palm them off in underfished parts of the country could therefore be an attractive proposition. There can be no overemphasis of the fact that Goa's near-shore waters are being scoured to death.

The largely untapped sea depths are undoubtedly where increased fish yields should be looked for. This

would require the government to make an appropriate technology choice. Only boats over 100 ft OAL with cold storage facilities, which can stay out at sea for a week on a trip, must be encouraged. These are expensive and would, in the first instance, be in the domain of the economically powerful. But the cooperative spirit has been growing in Goa in recent years and cooperatives of harried trawler owners to jointly operate deep sea fishing vessels could well be mooted.

It would be unrealistic, though, to have imagined that such a step would be encouraged by the powers that be. In its wisdom, the Government of India began to grant deep-sea fishing licenses to foreign owned vessels, which used to regularly poach on near-shore waters. It was only after a sustained and vociferous campaign by fisherfolk all over India that this scheme was restricted. The entire

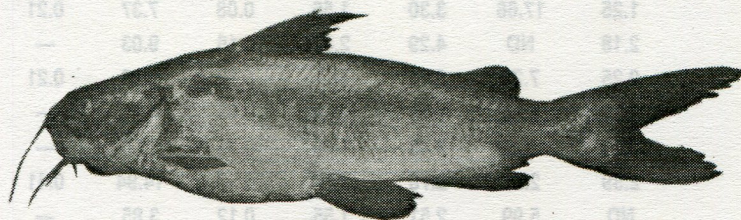
scheme was in fact a fraud on the fishing and fish-dependent population of India. For a mere \$25,000, the joint vessel owner was granted unlimited rights to fish in Indian waters right up to the 12 km limit from the coast. Often, these boats came within this area as well. Almost all of them had sleeping Indian partners. All the fish caught by these giant vessels, with the most ecologically primitive methods of fishing, were exported direct to the well-fed countries.

Fisherman rest on their non-mechanised boats in the evening

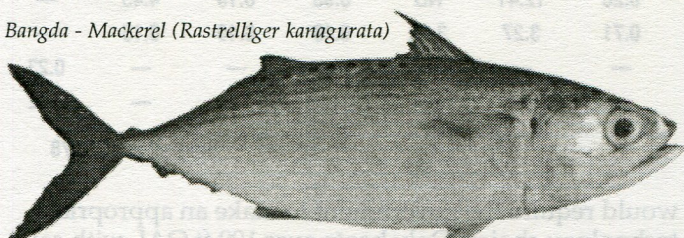


Biodiversity: Salt Water Fish

Goan names	Scientific names	Ghugum	Polycaulis uranoscopus	Hamp	Mene maculata
Tambo	Lutianus argentimaculatus	Ranwans	Polynemus heptadactylus	Bangada	Rastralliger kanagurta
Gobro	Serranus diacanthus	,	Polynemus sextarius	Bokado	Thunnus (Kishinoella) tenggol
,	Serranus malabaricus	Ghol	Pseudosciaena diacanthus	,	Thunnus (Neothunnus) albacares
,	Serranus sexfasciatus	Dodiario	Sciaena sina	,	Euthynnus affinis - affinis
,	Apogon multitaeniatus	,	Sciaena axillaris	Visvan	Cybius commersonii
Karkaro	Therapon therapas	,	Sciaenoides microdon	"	Cybius guttatum
,	Therapon puta	,	Otolithus argenteus	"	Cybius lineolatus
Callas	Pristipoma maculatus	Bale	Trichiurus muticus	Morso	Elacate nigra
,	Diagramma spp.	Arro	Caranx kurra	Luski	Echeneis remora
Burbudo	Scolopsis leucotaenia	Sheluk	Caranx hippos	Bhuyari	Platycephalus scambar



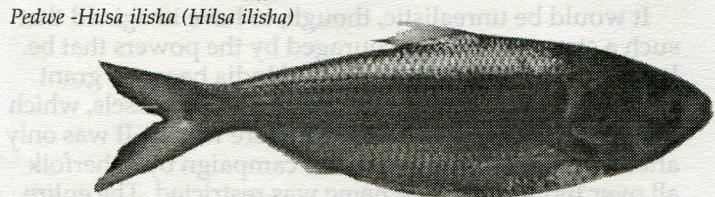
Sangat - Cat Fish (*Arius maculatus*)



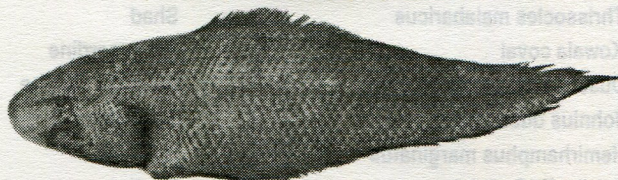
Bangda - Mackerel (*Rastrelliger kanagurata*)



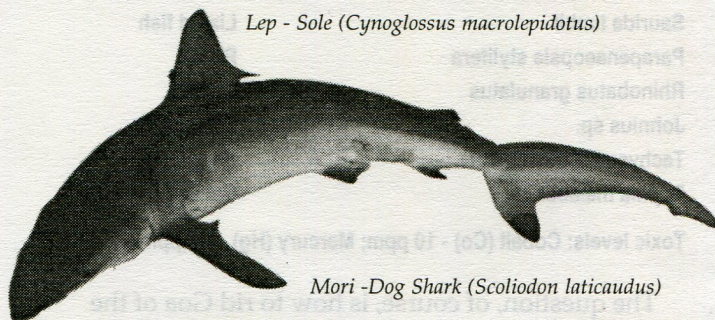
Tarlo - Indian Oil Sardine (*Sardinella longiceps*)



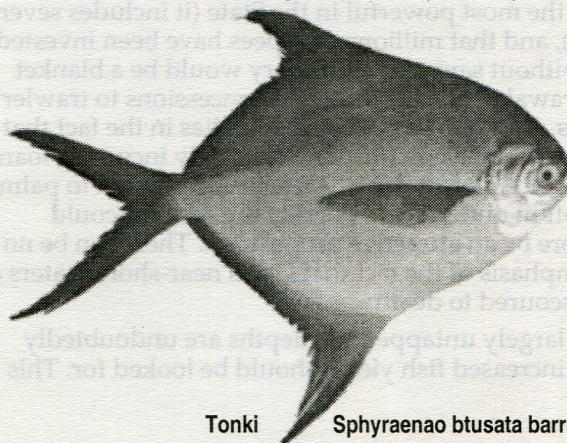
Pedwe - Hilsa (*Hilsa ilisha*)



Lep - Sole (*Cynoglossus macrolepidotus*)



Mori - Dog Shark (*Scoliodon laticaudus*)

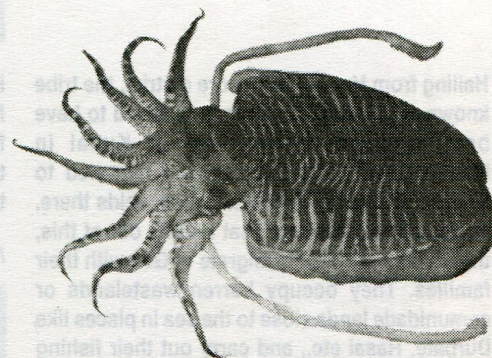
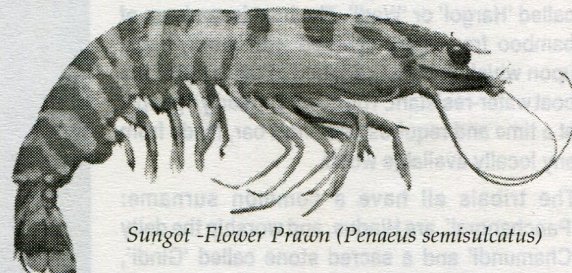
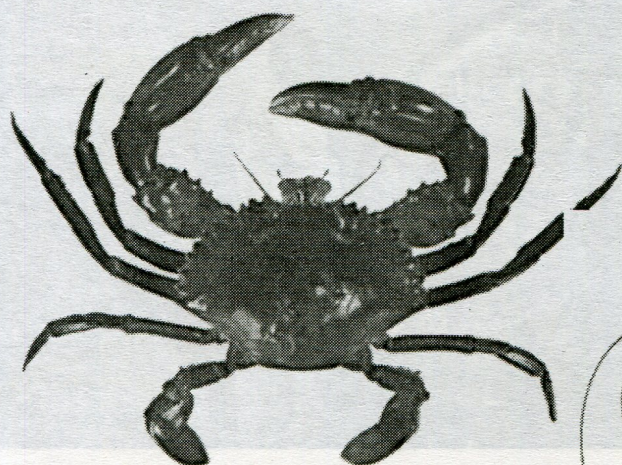


Surgnti - Silver Pomfret (*Pampus argenteus*)

Shatuk	Gerres filamantossus	Arro	Caranx rotti	Tonki	Sphyrna tiburo
Rane	Synagris japonicus	Diana	Chorinemus toloe	Dinas	Atherina forskali
Combo	Chactodon vittatus	,	Chorinemus moadetta	Lamb tonki	Fistularia serrata
,	Zanclus cornatus	Combo	Platax teira	Lep	Psettodes erumei
,	Drepane punctata	Khapi	Equula dussumieri	,	Pseudorhombus javanicus
Rane	Upeneioides sulphureus	,	Equula insidiatrix	,	Pseudorhombus tricellatus
,	Upeneioides vittatus	Khapi	Equula blochii	Lep	Solea ovata
,	Upeneus indicus	"	Equula daura	,	Cynoglossus elongatus
Palu	Chrysophrys datnia	Saundale	Lactarius lactarius	,	Cynoglossus semifasciatus
,	Chrysophrys berda	"	Psenes indicus	Tikle lep	Synaptura commersoniana
Tambade	Pterois russellii	Surgnti	Pampus argenteus	Sangat	Arius thalassinus
Unkir	Scorpaenopsis oxycephalus	Pamplet	Pampus sinensis	,	Rita spp.
Bande	Minous monodactylus	Halwa	Parastromateus niger	Kodem	Plotosus arab

Buckalhao	Saurida tumbil
Xevane	Exocaetus spp.
Bonzale	Engraulis purava
Tarlo	Sardinella longiceps
Ped	Sardinella fimbriata
Velli	Kowala Coval
Pedwe	Hilsa Ilisha
Dawak	Pellona indica
Tarsulo	Dussumieria acuta
-	Opisthopterus tartoor
Karli	Chirocentrus dorab
Valm	Muraenex telabonoides
Tadpani	Muraena undulata

	Chiloscyllium indicum
Vimsi	Pristis cuspidatus
	Pristis perrotteti
Phadke	Rhynchobatus oljeddensis
	Rhinobatus granulatus
Shokk	Narcine timlei
Waghole	Trygon bleckeri
	Trygon imbricata
	Trygon sephan
Shavane	Myliobatis nieuhoofii
waghole	Aetobatis narinari
Waghi	Penaeus Monodon
Sungot	Penaeus indicus

Bebo - Cuttle Fish (*Sepia* sp.)Sungot - Flower Prawn (*Penaeus semisulcatus*)Kulli - Mud Crab (*Scylla serrata*)Kulli - Sea Crab (*Portunus sanguinolentus*)Samudracho Hippocampus guttulatus
ghoddoChamat Tricanthus brevisrostris
, Monocanthus spp.

Banchochho Ostracium cornutus

Banchochho Tetradon inaermis

, Diodon hystrix

Mori Carchcarius melanoptera

, Carchcarius palarrohh

Scoliodon serrakewah

Kanara mori Zygaena blochii

, Zygaena malleus

Sunare Stegostoma tigrinum

Waghi - Tiger Prawn (*Penaeus monodon*)Solar - King Prawn (*Metapenaeus affinis*)

Sungot	Penaeus canaliculatus
,	Penaeus semisulcatus
,	Metapenaeus monoceros
Solar	Metapenaeus dobsoni
,	Metapenaeus affinis
,	Metapenaeus brevicornis
,	Parapenaeopsis styliifera
Para	Penaeopsis hardwickii
Galmo	Acetes spp.
Sungat	Hippolysmata ensirostris
Shivod	Panulirus homarus
,	Panulirus polyphagus
Kulli	Scylla serrata

Manki - Squid (*Loligo* spp.)

Kulli	Portunus pelagicus
,	Portunus sanguinolentus
Vichu	Squilla spp.
Bebo	Sepia spp.
Manki	Loligo spp.
-	Octopus spp.
Tissario	Paphia spp.
Sinani	Mytilum spp.
,	Mytilus viridis
Kalwa	Crassostrea spp.

Hunsur Fisher Folk

Hailing from Hunsur in Mysore district, the tribe known as the Naik Bhyasth is believed to have been originally inhabitants of Kudal in Maharashtra. They subsequently migrated to Mysore. Driven by decreasing fish yields there, and the unemployment that results out of this, the tribals periodically migrate to Goa with their families. They occupy barren wastelands or comunidade lands close to the sea in places like Durbate, Rasai etc., and carry out their fishing activities.

They fish in their indigenous saucer-shaped boats called 'Hargol' or 'Wadi'. The boat is made up of bamboo framework covered with gunny-bags, upon which there is a coating of tar to make the boat water-resistant. The boats can carry 4 people at a time and requires one short oar, made from any locally available wood.

The tribals all have a common surname: 'Panchangrai', are Hindus, and worship the deity 'Chamundi' and a sacred stone called 'Gindi', similar to a lingam. Fishing is seasonal, depending upon the weather conditions.

This tribe has similarity of cultural ethos with their Goan counterparts. For example, the tribe worships the sea and offers a coconut to the sea before the commencement of a new fishing after the cessation of the rains. As a mark of respect to their deity 'Mahadev', the tribe is strictly vegetar-

ian on Mondays. It is interesting to note that the Naik Bhyasths have not invited any animosity from the local fisherfolk, since the former restrict the area of their fishing only to a small stretch of the sea and moreover take only the coarser vari-

ety of fishes like the 'dhodiare' (johnius species). Therefore these nomadic fisherfolk from the neighbouring state are not perceived as a threat by the locals.

Manoj Borkar

Panchangrai tribal couples in inland Goan waters with their saucer shaped boats



The Results of the Ban on Monsoon Fishing in Kerala

The Kerala Government set up the Balakrishnan Nair Committee to go into the ban on monsoon trawling in the State as powerful segments of the mechanised boat industry had criticised the ban. The Expert Committee submitted its report recently. It has recommended a series of measures to sustain marine fisheries resources including the continuance of the trawling ban during the monsoon season (from July to August).

One of the findings of the Committee was that marine fish production increased considerably after 1989, the year in which the trawling ban was first imposed.

Referring to the ban on the operation of ring seine and purse seine nets and also pelagic/mid-water trawls in the territorial waters imposed by the State Government as far back as 1980, the Committee observed that nothing had been done for effective implementation of that specific ban. It urged the Government to give high priority to implementation of the ban if fisheries resources were to be conserved.

The Committee recommended a ban also on the use of outboard motors exceeding 25 HP capacity on traditional fishing craft during the trawl ban period in the State's territorial waters. It also touched on the need to quantify the fish discarded at sea by both traditional and mechanised boats so as to determine realistic mesh sizes of nets used.

It further recommended a ban on the catching of undersized prawns, shrimps, crabs, lobsters, cephalopods and fin fishes throughout the year. It recommended the extension of the ban on landing, holding, selling and processing of undersized catches for export. It suggested that the allowable size of capture should be worked out by the Fisheries Department in consultation with the fisheries research institutes and universities.

Predictably the trawler owners acted adversely to the recommendations of the Committee. They disputed the conclusions of the Committee that the monsoon trawling ban had helped in increasing modern fish stocks. They said that the Committee's conclusion was based on the export performance of Kerala where large quantities of fish were being brought from other States to feed the processing plants.

The Committee, however, rejected the contention as it had come to its own conclusions based on statistics on actual fish landings in the State supplied by Central Marine Fisheries Research Institute and not based on export figures.

A member on the Committee, Dr. B. Madhusoodana Kurup of the School of Industrial Fisheries, Cochin University of Science and Technology, said that the situation was considered from an angle of three parameters:

a. whether the ban led to an increase in fish landings;

b. whether it resulted in revising the stock position leading to improvement in CPUE (catch per unit effort); and

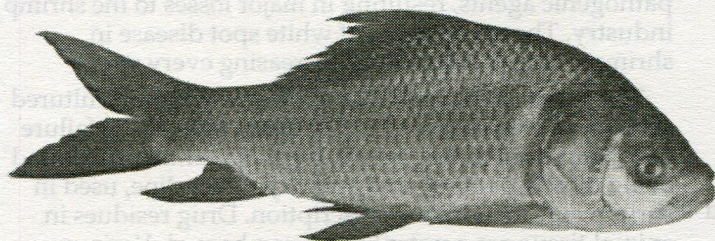
c. whether it has resulted in a real improvement in the size groups of the exploited commercial fisheries.

Having found the answers to these three parameters satisfactory, the Committee recommended the continuation of the ban. It was pointed out that after the implementation of the ban, the landings went up to 4.93 lakh tonnes in 1988 from a level of 3.03 lakh tonnes in 1987. The catches went up further to reach 6.73 lakh tonnes mark by 1990 and thereafter, the landings stabilised at 5.7 lakh tonnes. It was also mentioned that the increase of catches (in terms of percentage at 70%) was uniform in the pre-monsoon, monsoon (ban period) and the post-monsoon season. It was also mentioned that the share of the total annual landings in each of these three seasons had remained more or less the same during the pre-ban and ban periods.

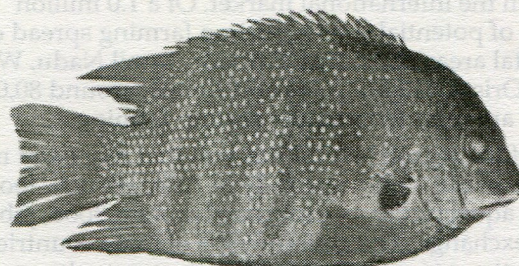
Another member on the Committee Mr. Shajahan said that the CPUE per trawl net had gone up by 195.82 kg to reach a level of 452.29 kg after the introduction of the ban. Thus, though the trawlers had lost about 45 days of fishing during monsoon due to the ban, they had been more than adequately compensated because of the improvement in catch per unit effort.

Biodiversity: Fresh Water Fish

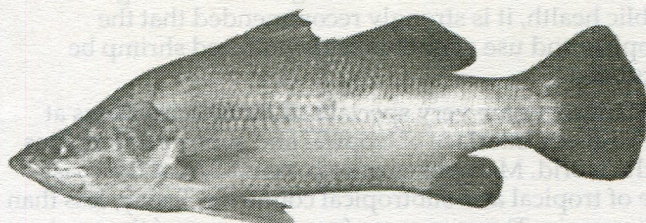
Goan names	Scientific names	Hinjaw	Clarias Magur	Gholsi	Chanos chanos
Chanak	Lates calcarifer		Ompak bimaculatus	Walm	Anguille spp.
Tambo	Lutianus Johnii		Wallago attu	Pepa	Syngnathus serratus
Burranto	Ambassis commersonii	Bombil	Harpodon nehereus	Kunbe	Meretrix meretrix
Burranto	Ambassis gymnocephalus	Tonki	Belone cancila	Potting	Palaemon styliifera
Karkaro	Therapon jarbua		Hemirampus canteri		Palaemon spp.
Callas	Pristipoma hasta	Kanare	Haplochilus lincatus		Macrobrachium rosenbergii
Shatuk	Gerrus lucidus		Labeo rohita		
Mutre	Scatophagus argus		Labeo spp.		
Ankrat	Teuthis eramin		Cirrhhina mrigala		
Ranwans	Polynemus tetradactylus		Catla catla		



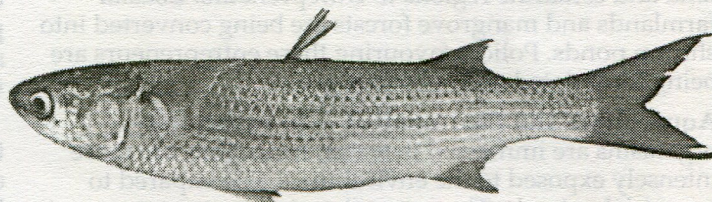
Catla - Kanare (Catla catla)



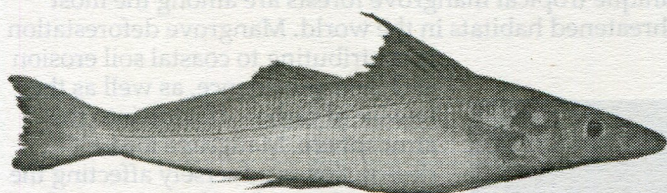
Pearl Spot - Kalunder (Etroplus suratensis)



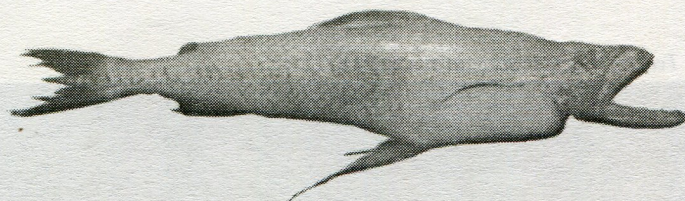
Chanak - Bekt (Lates calcarifer)



Mullet - Sevto (Mugil cephalus)



Silver Sillago - Muddosi (Sillago sihama)



Bombay Duck - Bombil (Harpodon nehereus)

Dodiario	Umbrina dussumieri		Barbus melanostigma
Khapi	Equula ruconius	Tel dadhi	Raibora daniconius
Muddoshi	Sillago sihama	Dinas	Danio spp.
Prursandi	Gobius giuris		Cyprinus carpio
	Gobius spp.		Chela spp.
	Gobiodon spp.	Bonzale	Engraulis indicus
Tambade Balle	Trypauchen vagina		Engraulis dussumiersi
Ingi	Mastacembalus armatus		Engraulis mystax
Shevto	Mugil cephalus	Capsali	Coilia dussumieri
Chikale	Ophiocephalus striatus	Jibber	Chatoessus nasus
Kalunder	Etroplus suratensis	Pedwe	Hisla toli
Dinas	Bregmaceros meclellandi	Jibra	Andontosoma chakunda
Sangat	Macronis gulio	Ker	Megalops cyprinoides



MODERN AQUACULTURE : NEW RECIPE FOR DISASTER

Background — The late '80s and early '90s saw a big boom in aquaculture in all coastal areas of the country. This was during the days when the ideology of liberalisation was the new flavour of the day for the Indian ruling classes. Exports were being pursued at any cost. Seeing the booming international trade in prawn and shrimps, entrepreneurs jumped onto the bandwagon. Thousands of hectares along the coast were acquired and converted to semi-intensive and intensive aquaculture.

Shrimp culture, both in brackish and fresh water, has been increasing day by day with the increased demand of shrimp in the international market. Of a 1.0 million hectares of potential site for shrimp farming spread over the coastal areas of Andhra Pradesh, Tamil Nadu, West Bengal, Orissa, Gujarat, Goa and Kerala, around 80,000 hectares are reportedly under shrimp farming.

Part of the reason behind this was that more and more countries of the world, specially in Asia, are now looking towards aquaculture as a source of protein, food, jobs and foreign exchange. The governments of these countries, in a bid to attract more investment in the aquaculture industry, have been leasing large tracts of agriculture land and estuarine regions to entrepreneurs. Coastal farmlands and mangrove forests are being converted into shrimp ponds. Policies favouring these entrepreneurs are being formulated and subsidies given.

Aquaculture and Environment — In aquaculture, organisms are immersed in water, hence they are more intensely exposed to the environment as compared to terrestrial animals. Thus, aquatic animals are more sensitive to pollution, whether it is chemical or their own excrement. Out of greed to make maximum profits through intensive aquaculture, the farms utilise dense

stocking rates, which induce problems of stress and increase susceptibility to diseases. Overcrowding leads to poor water quality due to decreased oxygen level, high accumulated metabolic products and excrement, rapid growth and transmission of noxious parasites, microorganisms and pathogens, also resulting in concentration of nitrates and phosphates in the aquaculture environment leading to pollution.

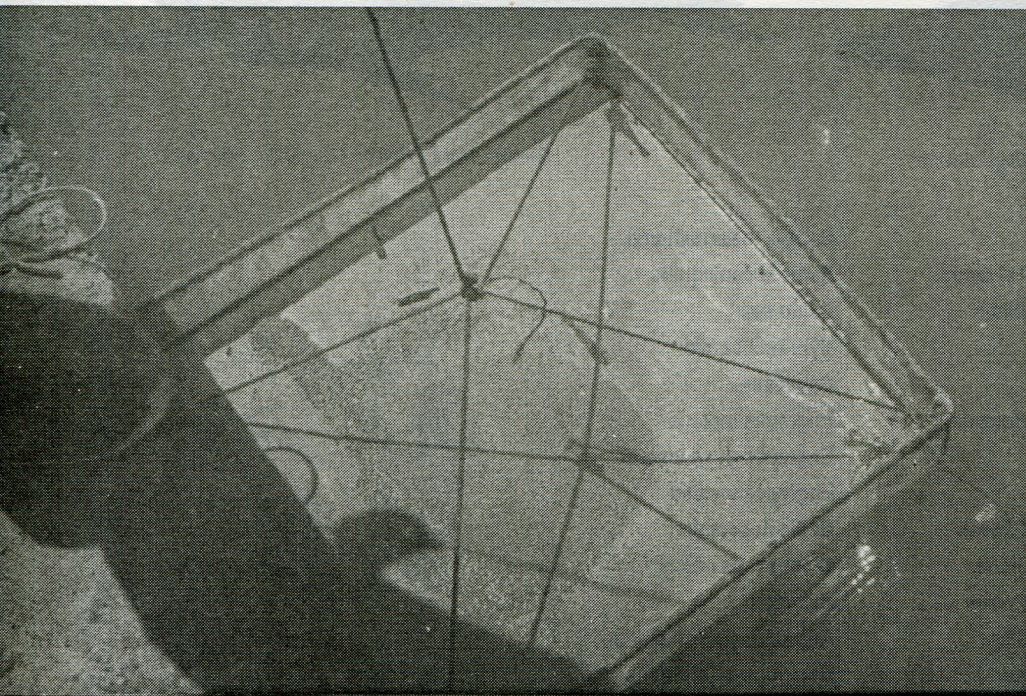
The most significant pathogens that are commonly associated with the culture of penaeid shrimps belong to viruses, bacteria, fungi, parasites and algae. 14 of the 30 reported viruses are of penaeid shrimps. Viral diseases and associated mortalities are emerging as the major threat to penaeid shrimp culture. Since 1992, a viral syndrome in penaeid shrimp commonly referred to the 'White Spot Disease' (WSD) has overshadowed all other pathogenic agents, resulting in major losses to the shrimp industry. The occurrences of white spot disease in shrimps culture seems to be increasing every year.

The result of the high rate of drug residues in cultured shrimp, as was observed in Thailand, reflects the failure of shrimp farm management, the major antibiotics found being mostly oxolinic acid and oxytetracycline, used in shrimp culture without prescription. Drug residues in animal tissue are a potential human hazard. Various problems, including toxicity and allergies to antimicrobial drug residues, e.g. penicillin, chloramphenicol, tetracycline and others, have been recognized. To safeguard public health, it is strongly recommended that the supplies and use of antibiotics in cultured shrimp be regulated.

Mangroves are very specialised forest ecosystems at the land-sea interface of tropical and subtropical regions of the world. Mangroves once covered 3/4 of the coastline of tropical and subtropical countries. Today, less than 50% remain. The mangrove forests are one of the most productive and biodiverse wetlands on Earth. Yet, these unique tropical mangrove forests are among the most threatened habitats in the world. Mangrove deforestation

is contributing to coastal soil erosion and land subsidence, as well as the release of carbon dioxide into the atmosphere. Mangrove forest destruction is adversely affecting the future of countless fisherman and aquaculture farmers along the coasts. Culture of penaeid shrimps integrated with mangroves has been more of a detriment than a benefit to food security; as with shrimp farming, large areas of natural mangroves have been cleared to construct ponds. The most significant cause of mangrove forest destruction in the past decade has been the consumer demand for luxury shrimp or prawns and the corresponding expansion of export oriented shrimp aquaculture. Intensive logging of mangroves and conversion of the area to shrimp aquaculture have caused a rapid loss of large areas of productive forests and other coastal wetlands and increased the intensity of pollution.

Feeding tray with shrimps at aquafarm



Loss of agricultural lands, grazing lands and rice fields have been noticed in several countries. In Thailand contamination of orchards, rice farms and fresh water canals was caused by wastes from shrimp farms. Many small rice farmers were forced to look on helplessly as shrimp industries destroyed their farms. In Bangladesh, rice production crashed from 40,000 mt to just 36 mt in 10 years in the Sathvira region because of salinity intrusion from shrimp ponds. In Thailand too, rice yields fell by 50% as a result of shrimp farming in the region. In Andhra Pradesh, ragi cultivation has been affected by salinity caused by shrimp farming.

The setting up of shrimp farms all along the coasts of India in an unscientific manner by industrial giants, with the blessing of the government and those in power is one instance of development of the rich against the need for holistic development of our society.

Shrimp farming activity whenever carried out in an area has resulted in pollution and reduction of the water quality of the river waters used in the shrimp ponds.

Our investigations of shrimp farms in Goa confirm the findings of many scientists in all parts of the country that unscientific growth of aquaculture as well as shrimp farms cause environmental pollution leading to shrimp mortality.

Aquaculture: for Whom? — The products of the modern aquaculture farms are not meant for local consumption; in any case, they are priced far beyond the reach of the local people. All the produce goes to high-priced restaurants and is often earmarked entirely for export. Shrimp is a nonessential, luxury item of food. Farmed shrimp has become a major factor in the world export market, forming around 60% of India's seafood exports by value. India ranks 5th in the world production of shrimp (40,000 tonnes per year).

The high earnings may last for a short period of time, but there are long-term environmental effects, which are borne by the local people. They lose in terms of mangrove destruction, river pollution, loss of livelihood, loss of wild marine population and biodiversity. The small time fishermen and fish farmers lose out and the diet of local people gets impoverished, as the surrounding rivers and estuaries become devoid of fish due to pollution. Faeces and uneaten fish food cause significant water pollution. Over time, these materials can accumulate in the sediments on bay bottoms and result in the release of gases such as ammonia and hydrogen sulphide that are toxic to fish. Antibiotics used to control disease encourage the evolution of antibiotic resistant bacteria. Herbicides, which kill aquatic plants, are routinely used, adding to the pollution load.

Externalisation of the environmental cost of shrimp aquaculture has left many mangrove areas overexploited and derelict. Brackish water aquaculture has taken place at the cost of mangroves and these areas are ultimately abandoned due to acid soil problems, disease etc. Many farmers are forced to abandon their ponds due to the toxic cocktail of biological and chemical waste from intensive shrimp ponds. The strength of traditional approaches can be seen from the fact that combined mangrove-shrimp land use patterns have largely escaped the recent shrimp disease catastrophe.

Intervention by the Supreme Court — The large number of problems caused by modern aquaculture led to the filing of a number of PILs in the Supreme Court. The Apex court then ordered NEERI to conduct a quick survey of the shrimp farms in the coastal areas of the country. The NEERI study found that agricultural land was being converted into shrimp farms, groundwater was getting salinized, mangroves were being destroyed and villagers losing their traditionally recognised rights to common property resources. Taking note, the Court said that these farms are causing environmental pollution, besides soil erosion, thus resulting in unemployment. The Court directed the Union Government to create an authority under section 30 of the EPA. The authority will be responsible for the closing down of aquaculture farms and determine the amount of compensation payable for causing soil depletion and erosion. The Court also pointed out that traditional shrimp farming is pollution-free and advised improvement in this through modern scientific techniques. It also observed that the amount of shrimp caught in the wild is more as compared to farm shrimp. The Court ordered closure of all semi-intensive shrimp farms within 500 m from the HTL from 31st March 1997 and also advocated the 'polluter pays' principle.

The situation in Goa — Traditional aquaculture has been practised for several decades in Goa (*see chapter five: coasts*). But with the boom in modern aquaculture in the 90s, the Government began to invite several large companies to set up huge aquaculture farms based on expensive technologies. Little heed was paid to the warnings regarding the massive social and environmental costs involved in intensive aquaculture—the potential rewards to politicians and bureaucrats were too great for such things to count for much in the calculations of the decision-makers.

Goa came under the influence of the aquaculture fever in 1991-92 with the setting up of Hindustan Prawns at Marna village, Bardez. More and more proposals for aquaculture farms were approved and Goa was set firmly along the path to intensive aquaculture. It is not that the dangers were unknown, but the government bodies charged with protecting Goa's environment continued to display the same lackadaisical attitude to which we have by now become habituated (though not resigned).

The agenda for the 7th meeting of the Goa State Committee on Environment held on 10.3.92, included the environmental implications of the proposed prawn hatchery of Skypak Fisheries Limited at Mandrem, in Pernem. The Agenda Note records: 'Requirement of sea water is 200-300 cu m per day. Sea water is to be sterilised before use and discharged back into the sea. Hence there is no pollution. The fresh water requirement per day is about 5-10 cu m and the same will be obtained from the existing wells.'

The Agenda Note on the proposed prawn hatchery of M/s C.M.E. Industries records: 'The site is found suitable for spawning and hatchery. It is proposed to use sea water through PVC pipes below the low tide mark.'

'The sea water requirement is estimated to be to the tune of 400-500 cu m per day. Two reservoirs with capacity of 150 cu m in first phase, 300 cu m in second

Studies on the Negative Effects of Aquaculture

• Aquaculture and the Environment by Cherian Thomas and K. C. Bellarmine.

Modern aquaculture farms occupy fairly large tracts of land, in some cases encompassing several hundred hectares. Development of these lands include activities such as clearing, leveling, excavation, filling and other construction.

Such large scale land development could adversely affect the following aspects of the environment:

- i. Destruction of vegetation in the area particularly coastal mangroves, resulting in soil erosion and displacement of wildlife from their natural habitats;
- ii. Depletion of water resources due to indiscriminate and large scale use of groundwater;
- iii. Change in land use pattern, in particular conversion of agricultural and grazing lands;
- iv. Soil erosion at construction sites, excavation of hillocks for bund construction and pollution due to construction spoils;
- v. Clustering of too many projects in a locality resulting in resource strain and large scale environmental pollution;
- vi. Rehabilitation and resettlement of families in cases of occupied lands.

Environmental effects of aquaculture operations:

Aquaculture operations involve the use of large quantities of water pumped in directly from the sea, creeks, estuaries or other water sources. As mentioned earlier, farm and hatchery operations involve the addition of significant amount of feed, chemicals, manure, etc. The water is circulated in the ponds/tanks and discharged into the same sources from where it is drawn. Processing operations generate effluents, due to the use of mild chemicals, and other disinfectants used for cleaning. The beheading/peeling/de-veining operations also generate appreciable quantities of organic wastes. The magnitude of impact on the environment is dependent on the level of technology employed i.e. whether intensive, semi-intensive or extensive. The adverse affects of aquaculture operations are summarised as follows:

stage, are proposed. The waste water will be let out into the sea. It is claimed that waste water will not contaminate the sea water.

This was the casual approach taken when these projects were discussed. One wonders how discharge of waste into the sea and tapping of large quantities of fresh water within the 500 m zone can have no direct environmental impact.

There arose the further question of whom the benefits would be flowing to. The government did not even try to claim that the production would be for the domestic market; the whole production was clearly earmarked for the lucrative export market.

i. Pollution due to discharge of waste water containing unused feed and other potentially harmful chemicals used in the farm/processing plant. In farm operations, water discharge could also be a channel for disease transmission to the environment in the event of a disease outbreak in the farm;

ii. Sludge production due to the accumulation of unconsumed feed, excreta, prawn exoskeleton (shell) shed during moulting, organic manure, lime, etc. Part of the sludge would be discharged along with the waste water and the remaining would accumulate at the pond bottom; and,

iii. Noise and air pollution due to the operation of diesel gensets and pumps.

• Environment-Friendly Waste Disposal Techniques for Aquaculture Operations by Shaji B. John

The wastes from aquaculture ponds are pollutants containing nutrients such as nitrates and phosphates. They interfere seriously with the natural cycle of primary production, stimulating the growth of phytoplankton, if there is an unnatural change in ingested nutrients. Due to over fertilization the accumulated decaying organic matter consumes oxygen in water which results in the process of eutrophication. The decaying materials also cause health hazards by sheltering disease, causing microorganisms that remain on the wet sub soil to reach the sea through untreated sewage.

Waste water disposed from aquaculture ponds contain suspended materials, excess feed, faecal matter and will be high in ammonia with low oxygen content and pH values. Fishes fed on high protein diets excrete most of their nitrogen as ammonia or urea, which is harmful to living organisms. The water arising from such intensive culture ponds has a high intensity of waste, which will effect the natural water bodies and should be treated accordingly.

Another source of waste, related to aquaculture operations, is from the processing plants. The waste, which is also of organic matter, has to be disposed off systematically.

When large number of fish ponds are aggregated in a particular area, the intensity of waste disposed is very high which will upset the natural balance and in turn affect the availability of good quality water for culture purposes. The seriousness of these disturbances depend on a great deal on where the pollution occurs. It tends to be greatest around estuaries and inshore areas.

• Impact of Aquaculture Operations on the Environment by Dr. K. Alagarswami

The year 1988 saw the imprudence of the 'shrimp fever' with the collapse of shrimp culture in Taiwan, when the cultured shrimp production declined to 43,887 tonnes from the 1987 level of 89,622 tonnes. The super-intensive technology of stocking as high as 100 PL/sq m and associated overfeeding with efficient quality feeds, indiscriminate use of drugs and chemicals and repetitive use of polluted water, led to collapse of environment hygiene when viral bacterial and fungal diseases spread on an epizootic scale and took a heavy toll of shrimp production. Similar situations were to be witnessed in the Philippines and Thailand in subsequent years. More than anything else, serious economic losses in shrimp farms, brought about the awareness of looking into environmental aspects of aquaculture. Several countries now insist upon EIAs and EMPs for clearing aquaculture projects.



One could just possibly argue that the real situation regarding the environmental and social impact of aquaculture was not known at that time. But such an argument is untenable now. The courts have prodded the Central Government into action and modern intensive prawn aquaculture has come under considerable regulation when it has not been banned outright. But the response of the Goa Government has been pathetically inadequate. Committees headed by the Collector have been set up at the District level to monitor and regulate aquaculture activity. Meanwhile, aquaculture farms are continuing their operations as before.

Traditional aquaculture has been one of the important food sources of the Goan population. It has been carried

out for centuries in the *khazan* lands and other coastal low-lying areas along estuaries, creeks and canals. The ponds used are tidally fed. The seed of mixed species comes in with the tides and is dependent on natural food; the water intake and drainage are managed through sluice gates; and harvesting is done periodically during new and full moon by placing traps and baynets at the sluice gates. It is important to note that during monsoons paddy is cultivated and it is only in other seasons that shrimp/fish crop is cultivated. This type of aquaculture is environment-friendly, dispenses with artificial feed, drugs and chemicals, is based on an optimum use of resources, without diverting land away from agriculture and provides an important part of the protein needs of the local people. Not so modern intensive aquaculture.

For purposes of argument, one could say that the Goans could bear such environmental degradation, since the farms would provide them with important protein, in the wake of stagnating marine catches. However, neither the Government nor the promoters of the hatcheries are even willing to make the claim that they are setting up the farms purely for the domestic market. It is extremely clear that the products of the aquafarms are all destined for export. Even where aquaculture is aimed at producing fish varieties of a commercially lower value, the end result is the same. One planning commission member has already noted that mussel, which is commercially relatively unimportant, can be minced and used as prawn feed, the prawns of course to be sent to export markets.

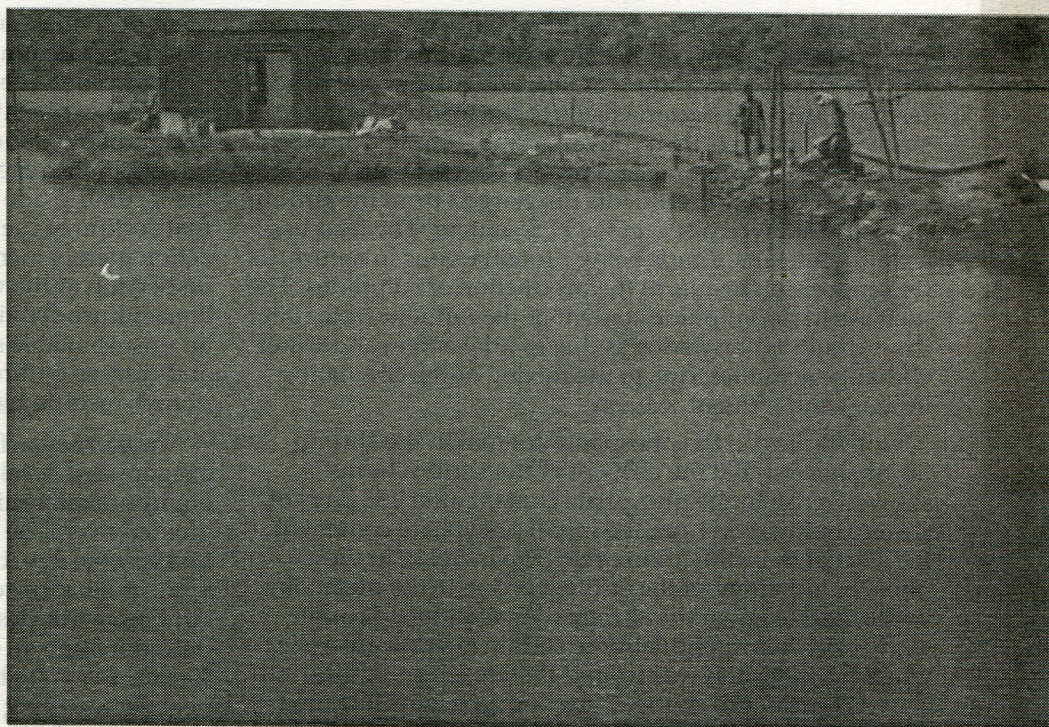
So, it does seem obvious, that the aquaculture proposals are bound to be completely tangential to the real problem facing Goa's fisheries. At the most, they can be an insignificant supplement to annual fish catches, with the added rider that while the geographical space the farms must occupy will go out of the access of village folk, the environmental problems are bound to be dumped in the same folks' backyards.

Aquaculture areas under the Brackishwater Fish Farmers Development Agency (BFDA) and Marine Products Export Development Agency (MPEDA) cover 83.50 and 17 ha respectively.

There are an estimated 400 tidal fed fish/prawn filtration farms along the banks or creeks and rivulets bordering the rivers in the tidal zone. Around 100 ha have been developed during the past five years.

Environmental Impact of Shrimp Farming in Goa — During our investigations, water samples were collected from the shrimp farms situated in Goa. Water samples were collected from various ponds upto the harvest. In all the farms mentioned above, it was established that organically rich feeds were used as nutrients for the shrimps. As the shrimps passed into various stages of growth (from post-larvae into juveniles into sub adults), the amount of feed input into the shrimp pond increased,

Aquafarm at Verem



and with it, naturally the pollutants released also increased.

The effluents discharged from the shrimp farm showed a rise in BOD (Biological Oxygen Demand). The increase in the BOD of the effluent waters and of the shrimp pond waters was found to be due to the residual unconsumed feed which settles to the bottom of the pond and gets decomposed as the waters are discharged. Besides, the metabolic wastes of the shrimps also add to an increase in the BOD. Later on the *influent* waters too did show a slight increase in BOD from the initial value. This was due to the fact that, during stocking, no feed was applied and the organic load was low in the river. But as the time for harvest approached, the organic load increased the levels of BOD in the circulating influent waters. The effluents discharged from the shrimp farm at the end of the culture period too, showed an increase in levels of BOD.

The influent waters also showed an increase in COD (Chemical Oxygen Demand) after several weeks of the cultivation period. Similarly the shrimp pond too showed a rise in COD at the end of the culture period. The effluent waters also showed an increase in COD. The increase in the COD of the effluents is due to the unconsumed residual feed. The feed contains oils, colour, and chemicals as supplements which add to the COD, as shrimp cultivation progresses. The metabolic wastes of the shrimps too increase the organic load. The increase in the COD of the influent may be due to the mixing of the circulating influent and effluent waters. Besides, it was observed that domestic wastes from the surrounding village houses also contributed to the increase in COD as the sewage waters are released in the same estuary feeding the shrimp farms.

As regards our studies on ammonia and nitrates, the effluent waters of the various shrimp farms showed an increasing trend over the 135 days cultivation period.

These were higher than the influent ammonia and nitrate contents as nutrients for the shrimps are proteinaceous in nature. The decomposition of the residual, unconsumed feed by nitrifying bacteria leads to the formation of ammonia, which is then converted into nitrates, thus increasing the ammonia and nitrate content in the effluent waters. The effluents discharged from the shrimp farm also showed a rise in the H_2S content. The feed used as nutrients for shrimps being proteinaceous in nature, its decomposition results in the production of sulphides. The increase in the sulphide content of the influent water later during cultivation period is due to tidal action and water exchange activities, due to the mixing of the circulating influent and effluent waters.

Our studies on the phosphate content in the shrimp farms showed that the effluent of the shrimp farms showed a rise in the phosphate content after 135 days of shrimp cultivation from the initial phosphate content at the start of the cultivation cycle. The increase in the phosphate content of the effluent is due to the metabolic waste discharges of the shrimps. As mentioned earlier, studies on the water quality of certain farms were done when the monsoon was on and therefore agricultural activity was in full swing. Chemical fertilizers like urea and superphosphates were being used. These were washed into the open estuary by rain waters and tidal action, which led to an increase in the phosphate content of the influent too.

The microbial count of the effluent waters always showed increases after 135 days of shrimp cultivation, indicating that shrimp cultivation generates nutrients conducive to microbial growth. This increase is due to the decomposition of the residual feed which settles at the pond bottom. This higher organic load and nutrients such as nitrates and phosphates lead to the increase in the microbial count in the shrimp pond and the effluent. Similarly, the influent too showed an increase in the viable count. The increase in the microbial count of the influent was often due to the mixing of the circulating effluent and influent waters, over the cultivation period. Domestic sewage released into rivers, also play a role in increasing the microbial count in the water bodies.

Poor water quality of water bodies often leads to disease. This has been already confirmed by earlier scientific studies on the occurrence of fish disease in Goan estuaries due to agriculture runoff, which contaminates estuaries, lowering the water quality and placing the aquatic animals under stress, thus lowering their immunity, and leading to disease. Similarly, livestock on aquaculture farms also get affected due to poor water quality. Nutritional deficiencies lead to shrimp suffering from gill disease and tail rot. In shrimp farms, 'vibriosis' is the most common disease since the conditions of shrimp ponds are ideally suited for the proliferation of the species. Investigations by Prem Anand revealed that potential shrimp pathogens are found in considerable number in aquaculture systems.

Conclusion — Although aquaculture has been projected as a panacea for Third World poverty, its advocates ignore the facts that it spawns a whole host of problems for which there are no solutions. Nature has immense capacity to recover from minor modifications of the environment: this has been characteristic of the develop-

ment of civilisation during most of recorded history. But man was lulled into a false sense of security, feeling that he could continue to use estuaries as an unlimited source of exploitation beyond sustainable limits. The ebb and flow of tides may cause significant lateral mixing in the reaches of rivers near the estuary. Indeed, the incoming tide often reverses that direction of flow in that section of the river. In the estuarine channels, tidal action merely increases the amount of mixing and dispersion of the waste along the length of the river. The aquaculture activities (shrimp farms), have resulted in an unsustainable system with polluted surface water and disease outbreaks, and are therefore often abandoned, resulting in huge economic losses.

The earnings of shrimp aquaculture have been exaggerated, while the real costs in terms of consequent environmental ruin and social disruption have been glossed over. The immediate profits temporarily satisfied an elite few, but vast numbers of coastal residents were in the long term displaced and impoverished. And, now this destructive industry is moving with great determination all over the coast, threatening mangrove forests, sea grass beds and coral reefs, while simultaneously usurping the agricultural land resource use rights of traditional farmers and fisherfolk.

Dr. Joe D'Souza & Nagesh Colvalcar

THE SUPREME COURT AND GOA AQUAFARMS

The Supreme Court of India heard—over several months and in great detail—a petition against aquafarms in the country and their negative environment impacts. During the course of hearings, it requested the National Environment and Engineering Research Institute (NEERI) to visit aquafarms across the coastal states and provide it with detailed reports. Based on these reports, and on several other expert studies, the Supreme Court delivered a resounding judgement on aquaculture and related issues. The judgement, which was delivered on 11.12.1996 by environment judge, Kuldeep Singh (AIR 1997 SC 811, *S. Jagannathan v/s Union of India*), is a masterpiece of environmental jurisprudence. After recording its findings, the Court went on to direct all district authorities in coastal states to demolish those aquafarms that had been constructed in violation of the CRZ Notification. Several aquafarms set up in Goa were also shut down.

If the directions given in the judgement had been strictly followed, the devastation caused by aquaculture would have been largely contained. However, affected parties including a few State Governments moved the Supreme Court for a review of the judgement. The review petition was finally admitted by the Supreme Court after a period of four years. While admitting the petition, the Supreme Court directed the Aquaculture Authority of India (AAI) to submit an Environment Impact Assess-

ment of aquafarms. The Aquaculture Authority of India constituted a Sub-Committee to prepare the EIA. It put on the Committee the very institutions that had filed the review petitions! Naturally, the EIA report submitted by the AAI to the Supreme Court has turned out to be a white-wash of the entire industry and its blatantly irresponsible attitudes towards the environment and coastal ecology.

Assisted by Dr. Nandkumar Kamat and Dr. Joe D'Souza, the Goa Foundation filed a detailed critique of the AAI Report in the Supreme Court. The Foundation also provided, in a separate affidavit, a list of the aquafarms that had been shut down pursuant to the Court's directions and showed how all these farms, barring a couple, had been reopened by the AAI despite the directions given by the Court and even though they were in CRZ areas. The official list of aquafarms in Goa is provided on the following pages.

Directions given by the Supreme Court on 11.12.1996:

1. The Central Government shall constitute an authority under Section 3(3) of the Environment (Protection) Act, 1986 and shall confer on the said authority all the powers necessary to protect the ecologically fragile coastal areas, sea shore, water front and other coastal areas and specially to deal with the situation created by the shrimp culture industry in the coastal States and Union Territories. The authority shall be headed by a retired Judge of a High Court. Other members, preferably with expertise in the field of aquaculture, pollution control and environment protection shall be appointed by the Central Government. The Central Government shall confer on the said authority the powers to issue directions under section 5 of the Act and for taking measures with respect to the matters referred to in clauses (v), (vi), (vii), (viii), (ix), (x) and (xii) or subsection (2) of Section 3. The Central Government shall constitute the authority before January 15, 1997.

2. The authority so constituted by the Central Government shall implement the 'Precautionary Principle' and the 'Polluter Pays' principles.

3. The shrimp culture industry/the shrimp ponds are covered by the prohibition contained in para 2 (i) of the CRZ Notification. No shrimp culture pond can be constructed or set up within the coastal regulation zone as defined in the CRZ notification. This shall be applicable to all seas, bays, estuaries, creeks, rivers and backwaters. This direction shall not apply to traditional and improved traditional types of technologies (as defined in Alagarswami report) which are practised in the coastal low lying areas.

4. All aquaculture industries/shrimp culture industries/shrimp culture ponds operating/set up in the coastal regulation zone as defined under the CRZ Notification shall be demolished and removed from the said area before March 31, 1997. We direct the Superintendent of Police/Deputy Commissioner of Police and the District Magistrate/Collector of the area to enforce this direction and close/demolish all aquacultural industries/shrimp culture industries, shrimp culture ponds on or before March 31, 1997. A compliance report in this respect shall be filed in this Court by these authorities before April 15, 1997.

5. The farms who are operating traditional and improved traditional systems of aquaculture may adopt improved technology for increased productivity and return with prior approval of the 'authority' constituted by this order.

6. The agricultural lands, salt pan lands, mangroves, wet lands, forest lands, land for village common purpose and the land meant for public purposes shall not be used/converted for construction of shrimp culture ponds.

9. Aquaculture industry/shrimp culture industry/shrimp culture ponds other than traditional and improved traditional may be set up/constructed outside the coastal regulation zone as defined by the CRZ notification and outside 1000 meter of Chilka and Pulicat lakes with the prior approval of the 'authority' as constituted by this Court. Such industries which are already operating in the said areas shall obtain authorisation from the 'Authority' before April 30, 1997, failing which the industry concerned shall stop functioning with effect from the said date. We further direct that any aquacultural activity including intensive and semi-intensive which has the effect of causing salinity of soil, or the drinking water or wells and/or by the use of chemical needs increases shrimp or prawn production with consequent increase in sedimentation which on putrefaction is a potential health hazard, apart from causing situation turbidity of water courses and estuaries with detrimental implication on local fauna and flora shall not be allowed by the aforesaid Authority.

10. Aquacultural industry/shrimp culture industry/shrimp culture ponds which have been functioning/operating within the coastal regulation zone as defined by the CRZ Notification and within 1000 meter from Chilka and Pulicat Lakes shall be liable to compensate the affected persons on the basis of the 'polluter pays' principle.

11. The authority shall, with the help of expert opinion and after giving opportunity to the concerned polluters, assess the loss to the ecology environment in the affected areas and shall compensate the individuals/families who have suffered because of the pollution and shall assess the compensation to be paid to the said individuals/families. The authority shall further determine the composition to be recovered from the polluters as cost of reversing the damaged environment. The authority shall lay down just and fair procedure for completing the exercise.

12. The authority shall compute the compensation under two heads, namely, for reversing the ecology and for payment to individuals. A statement showing the total amount to be recovered versus from the names of the (sic) whom the amount is to be recovered, the amount recovered from each polluter, the persons to whom the compensation is to be paid and the amount payable to each of them shall be forwarded to the Collector/District Magistrate of the area concerned. The Collector/District Magistrate shall recover the amount from the polluters, if necessary, as arrears of land revenue. He shall disburse the compensation awarded by the authority to the affected persons/families.

List of Aquafarms in Goa

North Goa District			
Sr. No	Owner & location of aquaculture farms/projects	Area in hectares	Particulars of license issued by Authority of India
1.	Shri Pradeep Parsekar, Chorao - Tiswadi	0.7 Ha	F No 33036/947/91 (FY) T-2 dt. 3/3/2000
2.	Shri Vasant Keshav Chopdekar, Chorao	2.2 Ha	F No 33036/955/91 (FY) T-2 dt. 14/12/99
3.	Mrs. Joanita Fernandes Carmulim	4.11 Ha 4 ponds	F No 33036/959/91 (FY) T-2 dt. 14/12/99
4.	Shri Venkatesh Godekar Vadi	1.07 Ha	F NO. 33036/957/91 (FY) T-2 dt. 14/12/99
5.	Shri Ajit Sukhija, Pilerne Bardez	1.31 Ha	F No. 33036/959/91 (FY) T-2 dt. 14/12/99
6.	Shri John Joseph D'Souza, Tuem Pernem	3 Ha	F NO. 33036/404/2000 (FY) T-2 dt. 2/8/2000
7.	Shri Bhagirath Gaonkar Chopdem-Pernem	0.99 Ha	F NO. 33036/950/91 (FY) T-2 dt. 14/12/99

8.	M/s Oceanic Aquaculture, Madkai Ponda	48 Ha	-
9.	Shri Savio Monteiro, Karabhat Chorao	48 Ha	F NO. 33036/953/91 (FY) T-2 dt. 3/3/2000
10.	Shri Vallio D'Silva, Madel-Chorao	1.10 Ha 5 ponds	F NO. 33036/963/91 (FY) T-2 dt. 14/12/2000
11.	Shri Anthony Fernandes Madel-Chorao	0.985 Ha 1 pond	F NO. 33036/963/91 (FY) T-2 dt. 14/12/99
12.	Shri Delbert Fernandes Madel-Chorao	- 2 ponds	F NO. 33036/964/91 (FY) T-2 dt. 14/12/99
13.	Ms. Sunita Menezes Madel, Chorao	- 4 ponds	F NO. 33036/965/91 FY (-) dt. 14/12/99
14.	Ms. Leticia Dole, Madel, Chorao	- 3 ponds	F NO. 33036/966/91 FY (T-2) dt. 14/12/99
15.	Shri Maxie Lewis, Madel, Chorao	- 7 ponds	F NO. 33036/967/91 FY (T-2) dt. 14/12/99
16.	Shri Srikant Kundaikar, Madel-Chorao	- 6 ponds	F NO. 33036/968/91 FY (T-2) dt. 14/12/99

17.	Dr. A.V. Rivonkar Batim, Tiswadi	2 Ha	F NO. 33036/975/91 FY (T-2) dt. 14/12/99
18.	Skypak Fisheries, Paliem	16.86 Ha 24 ponds	-
19.	Shri John Joseph D'Souza Paliem	6.7 Ha	F NO. 33036/404/2000/ FY (T-2) dt. 2/8/2000
20.	Shri Laxman R. Phadte Talaulim Durbat	2.5 Ha	F NO. 33036/976/91 FY (T-2) dt. 3/3/2000
21.	CME, (Diwar) Korgao Pernem	-	-
22.	Shri Shankar Jaganath Parsekar Kepem/ Arambol Pernem	-	-
23.	CME, (Diwar) Navelim-Diwar	-	F NO. 33036/2/2001/FY (T-2) dt. 27/3/2001
24.	CME, (Diwar) Navelim-Diwar	-	F NO. 33036/3/2001/FY (T-2) dt. 27/3/2001
25.	Deu Grande Orgal, Marcel	-	F NO. 33036/1/2001/ FY (T-2) dt. 27/3/2001

13. We further direct that any violation or noncompliance of the directions of this Court shall attract the provisions of the Contempt of Courts Act in addition.

14. The compensation amount recovered from the polluters shall be deposited under a separate head called 'Environment Protection Fund' and shall be utilised for compensating the affected persons as identified by the authority and also for restoring the damaged environment.

15. The authority, in consultation with expert bodies like NEERI, Central Pollution Control Board, respective State Pollution Control Boards shall frame scheme/ schemes for reversing the damage caused to the ecology and environment by pollutions in the coastal States/

Union Territories. The scheme/ schemes so framed shall be executed by the respective State Governments/ Union Territory Governments under the supervision of the Central Government. The expenditure shall be met from the 'Environment Protection Fund' and from other sources provided by the respective State Government/ Union Territory Governments and the Central Government.

16. The workmen employed in the shrimp culture industries which are to be closed in terms of this order, shall be deemed to have been retrenched with effect from April 30, 1997 provided they have been in continuous service (as defined in Section 25B of the Industrial

List of Aquafarms in Goa

South Goa District			
Sr. No	Owner & location of aquaculture farms/ projects	Area in hectares	Particulars of license issued by Authority of India
1.	Shri Michel Angelo Vaz, Curtorim Salcete	-	vide No. F 33036/969/99-FY (T-2) dated 14/12/99
2.	Shri Menino Joseph P. Fernandes Benaulim Salcete	-	vide No. F 33036/970 99-FY (T-2) dated 14/12/99
3.	M/s Taipan Sea Foods Ltd. Quelossim	-	vide No. F 33036/978/99-FY(T-2) dated 14/12/99
4.	Shri Francis Patric Estibeirol Curtorim Salcete-Goa	-	vide No. F 33036/977/99-FY(T-2) dated 14/12/99
5.	-do-	-do-	vide No. F 33036/974/99-FY(T-2) dated 14/12/99
6.	Shri Franklin Lourenco Maina	-	vide No. F 33036/972/99-FY(T-2) dated 14/12/99

Curtorim			
7.	Shri Savio Fernandes Benaulim Salcete	-	vide No. F 33036/961/99-FY(T-2) dated 3/3/2000
8.	Shri Joseph Romeo Pereira, Chinchinim	-	vide No. F 33036/971/99-FY(T-2) dated 3/3/2000
9.	Shri Laxman Raghuvir Fadte, Durbate, Talaulim	-	vide No. F 33036/976/99-FY(T-2) dated 3/3/2000
10.	M/s Zuari Tigers Aqua (P) Ltd. Quelossim Cortalim	-	vide No. F 33036/3/2000 FY (T-2) dated 29/3/2000
11.	Shri Aseimo Furtado, Carmona Salcete	-	No. 21-23/2001/Tech dated 24/9/01
12.	Shri Joseph R.N. Pereira Chinchinim Salcete	-	No. 21-23/2001/Tech dated 24/9/01
13.	Shri Jack Soter Luis Fernandes	-	No. 21-23/2001/Tech dated 24/9/2001
14.	Shri Reginaldo C. Oliveira Curtorim	-	vide No. F 33036/954/99-FY(T-2) dated 14/12/99

Salcete			
15.	Shri Armando Barreto Nuxivaddo Curtorim	-	vide No. F 33036/956/99-FY(T-2) dated 14/12/99
16.	Shri Antonio Pereira Codeavaddo Chinchinim	-	vide No. F 33036/958/99-FY(T-2) dated 14/12/99
17.	Smt. Isabela Pereira Quelossim Chinchinim	-	vide No. F 33036/953/99-FY(T-2) dated 14/12/99
18.	M/s Aqua Farms Sancoale, Mormugao	-	vide No. F 33036/957/99-FY(T-2) dated 14/12/99
19.	M/s Taipan Sea Foods Ltd. Quelossim Cortalim	-	vide No. F 33036/960/99-FY(T-2) dated 14/12/99
20.	Shri Anthony Colaco Simar Sanvordem	-	vide No. F 33036/949/99-FY(T-2) dated 14/12/99
21.	M/s Zuari Tigers Aqua (P) Ltd. Quelossim Cortalim	-	vide No. F 33036/1/2000 FY(T-2) dated 29/3/2000
22.	Shri Oxler Furtado Cavelossim Carmona	-	vide No. F 33036/2/2000 FY(T-2) dated 29/3/2000

Disputes Act, 1947) for not less than one year in the industry concerned before the said date. They shall be paid compensation in terms of Section 25-F (b) of the Industrial Disputes Act, 1947. These workmen shall also be paid, in addition, six years' wages as additional compensation. The compensation shall be paid to the workmen before May 31, 1997. The gratuity amount payable to the workmen shall be paid in addition.



Two Case Studies of Aquafarms

Aquafarm in Tuem — The case of a modern aquaculture farm at Tuem in Pernem taluka is an example not only of the kind of environmental problems such projects can generate but also of the inaction and open collusion displayed by the authorities when confronted with blatant violations of the law. The tortuous history of the matter should serve as a warning to other citizens who may have to face aquaculture projects coming up in their localities.

The Tuem Nagrik Samiti, an organisation of villagers, moved all the relevant authorities over four years but no action was taken to either suspend the project or control the pollution from it. The operation of the project led to gross pollution of the water supply of the villagers. Neighbouring paddy fields were seriously affected. Saline water was being pumped into the aquaculture farms directly from the Chapora river estuary and discharged back into it as effluent without treatment and in violation of law. The operations on the farm led to noise pollution and serious threats to public health. For example, firecrackers were often used to drive away birds or river animals that prey on shrimp. The owner also illegally excavated a hill 'to provide mud for the embankments.' These embankments were unlined and constructed in a wholly unscientific manner, allowing for large-scale seepage of salt water. Most of the aquaculture tanks were within the 100 metre no-development zone along river banks and therefore violated the CRZ notification and the judgement and directions of the Supreme Court.

The saga began in 1992 when the Brackish Water Fish Farmers Development Agency entertained an application from a prawn farmer from Mapusa for registering his aquafarm.

Though the farm was yet to get a licence, it nevertheless began operation. Gradually, various problems began to surface. Residents of the village noticed that ever since the prawn farm

had become operational, well water had become saline and the area had begun to smell. A canal that had been created alongside the reservoirs had become saturated with water and a breeding ground for mosquitoes.

Thereafter began the four-year long attempt of the villagers to get redressal for their grievances. In the process, they approached every conceivable authority without any effect. They first raised some of the issues in a letter to the Panchayat in 1995 and pointed out that it was not possible to operate the aquaculture farm without appropriate pollution control measures since it was in a residential locality.

Several residents of Soniem-Paliem ward also wrote to the Health Officer that same year complaining that the drinking water in their existing wells had become saline and hard. They drew the attention of the Health Officer to the fact that they had no other reliable source of drinking water. The letter also complained that the sludge created by the aquaculture operations produced a strong stink, which affected them even in their residences.

Meanwhile, agriculture operations were getting adversely affected as neighbouring cultivable land had turned saline. As the project continued to expand, the residents found that more and more wells were turning saline and polluted as a result of which residents had to walk long distances to procure potable water.

Finally, in 1997, the panchayat acted. The promoter was given notice by the panchayat that he was carrying out prawn production without permission. The panchayat directed him to stop such production immediately as it was likely to affect public health. The aquaculture operations carried on nonetheless. The Panchayat of Tuem next passed a formal resolution at its meeting held on 18.11.97 to shut down the farm. He, however, continued with his operations.

The second Gram Sabha of Tuem Gram Panchayat passed another resolution on 30.11.97 for demolition of the farm. In the interim period, complaints had been made to the Collector, the Health authorities, the Directorate of Fisheries, the Director of Panchayats and the Pollution Control Board. Soon thereafter, the farce of inspections began. The Collector of North Goa made a visit to the aquaculture farm on 14.5.1998. It appears that members of the Aquaculture Committee (North Goa) set up by the Aquaculture Authority of India also made a visit to the farm. The Committee did not bother to meet the affected villagers despite the fact that it was well known that there were several objections from them and others to the continuance of the aquaculture project.

The Tuem Nagrik Samiti organised a protest march against the aquaculture project and inaction of the authorities on 30.3.1998 in Panjim. Finally, disgusted with the lack of progress, the Tuem Nagrik Samiti approached the High Court in a writ petition. The High Court granted relief by restraining the prawn farm owner from putting in any new seed till he had the appropriate license from the AAI. The farm was closed for some years. Thereafter, it reopened again with a licence from the AAI!

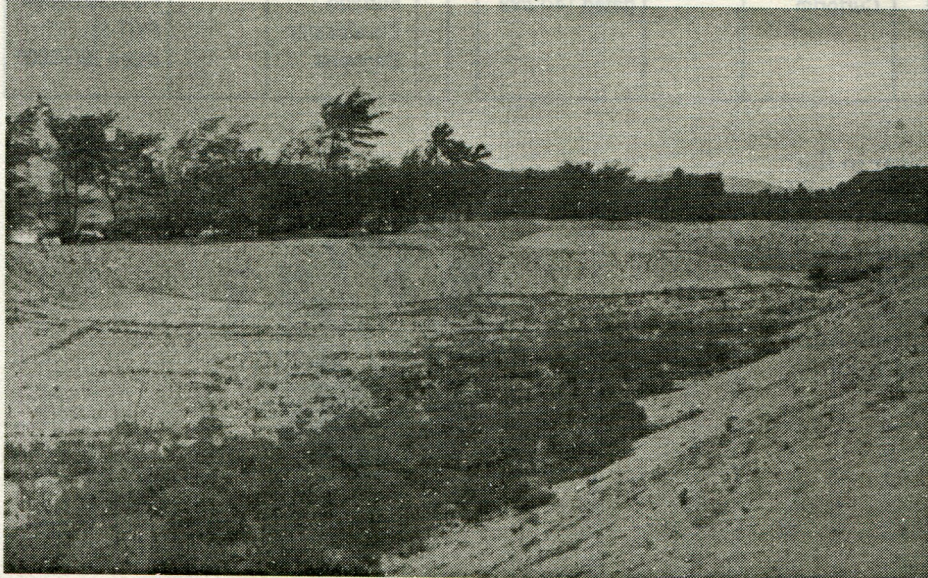
Aquafarm in Bhattie-Sandolxem — Seepage of salty water from an illegal shrimp farm at Bhattie-Sandolxem in Canacona taluka completely ruined around seven drinking water wells, paddy fields, and two fresh water ponds. Despite the fact that the shrimp farm was constructed right along the river bank, in complete violation of CRZ regulations, which prohibit such activity within 100 metres of the river banks, the authorities were slow to act.

The owner, Agostinho Barreto, constructed a 10,000 sq m pond, on the bank of the Talpona river. The water was changed every four months through two water pumps fitted for that purpose. The saline water from the pond seeped into the adjacent paddy fields and also into the fresh water ponds. The Directorate of Health Services, which examined the water in the wells in the vicinity, stated in its report that the water in all the seven concerned wells was not fit for human consumption.

There is no public water supply scheme in the village, and the villagers therefore depend solely upon their wells. Finally, the villagers, fed up with the whole situation, complained to the Mamlatdar of Canacona taluka, the Directorate of Fisheries, Directorate of Health Services, and the village panchayat of Pinguinim. The Directorate of Fisheries washed its hands off the matter.

Even at the Mamlatdar's office, a resolution of the issue took ages. After some time, the Mamlatdar pointed out in a show-cause notice issued to Barreto that shrimp farming along the river was banned by the Supreme Court. It was only in 1998, a full year after protests started, that orders were issued to demolish the prawn farm.

Abandoned aquafarm of Mekaster International at Talpona, after sand dunes were bulldozed



Tailpiece: The Turtle

The turtle has long been considered sacred by fisherfolk in Goa. It is considered a harbinger of good fortune, and, if trapped in a fisherman's net, released back into the sea.

But changed times and changed values have adversely affected our regard for our fellow-creatures, or forced us to dispense with such concern under various pressures, as these poignant excerpts from a story by the Sahitya Akademi award winner Pundalik Naik (translated from the Konkani by Vidya Pai) shows. You can find the story in the book, *Ferry Crossing*, edited by Manohar Shetty.

As soon as Vasu stepped into the village the children crowded round him, yelling, 'Turtle! He's brought a turtle! Vasukaka has brought a turtle!' Normally no one paid much attention to the children. But this time the word 'turtle' caught everyone's ears. Godmausi, who was snipping off the heads of dried shrimps, leaned over to get a better look. Shantabai's new daughter-in-law paused with her foot on the pedal of the sewing machine and poked her head out of the window. They stared from doors and windows, then out they came from every house to mill around Vasu, to goggle at the object in his arms. 'It's ages since anyone brought a turtle to the Kharvadda,' they breathed ...

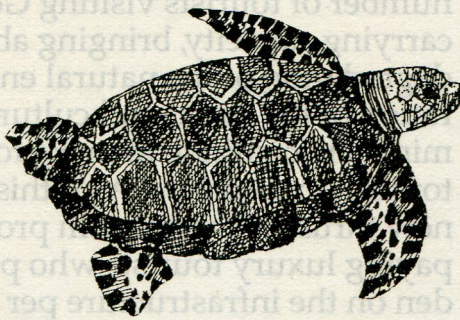
Vasu leant against the wall, nursing his aching arm. He'd set out in his canoe early that morning ... but though morning passed and the afternoon sun began to scorch his back, not a single fish nibbled at the line. He had grown tired of the wait and was about to dismantle the line when he felt a sudden tug. Vasu tried to pull the line in and to hoist the fish on to the boat but he had to strain every muscle and use all his skill to remain in control ... Finally, after a hard struggle, he managed to heave the catch on to the canoe, which tilted dangerously to one side. Vasu stared in amazement at the turtle that lay in the boat. He inspected his bleeding hand, bitten deep by the fishing line, and wiped his sweating brow. He'd seen bigger specimens than this one, he reflected, but he couldn't remember anyone having caught such a turtle on a line ever before. His father had netted a turtle once and he'd brought it home, much to the delight of everyone in Kharvaddo. People had streamed in to take a look at the creature much as they did to see the Ganesh idols on Chavathi. The house was decorated as though for a great *puja* as the turtle was worshipped and then taken out in a procession before it was released into the sea.

His wife beckoned him into the house and he followed her, not quite sure what he ought to say. 'What shall I cook now?' she asked.

'I caught that turtle. Nothing else. If I'd caught anything else I'd have got some money. In fact, I'd told Dambaab I'd get some fish for him.'

'And you brought that turtle.'

'I had to. I caught it on the line, didn't I?'



'You could have sold it. Surely someone would have paid four or five rupees for it. At least we wouldn't have to worry about food for a couple of days.'

'What's wrong with you?' Vasu was aghast. 'A turtle is sacred to us fisherfolk. Have you ever heard of any self-respecting fisherman selling a turtle?'

But she was more concerned about the empty vessel on the hearth and nothing he could possibly say would affect her. All his explanations were like streams of water flowing from an up-turned pot. Quite beside himself with rage, Vasu began to rain blows on the hapless woman.

'What sort of a woman is this!' he cursed. 'She has no respect for tradition. How many years is it since anyone caught a turtle, a sure sign of good fortune. How many people must be envying me today! Who knows, things may change like they did for my father. Money might flow in again. Maybe we can get new clothes and enough food to eat. Can one tell what lies ahead? Perhaps that is why I caught this turtle today, perhaps it is an indication of good fortune ... and this wife of mine! She's not fit to be the wife of a self-respecting fisherman! Sell the turtle for four or five rupees, she says!'

Suddenly he remembered those woodcutters sawing planks from the jackfruit tree in Dambaab's field. They stopped their work as he passed by with the turtle in his arms.

'Will you sell that?' they'd asked.

'It's a turtle!' he had retorted scathingly. He had wanted to say much more: Does a fisherman ever sell a turtle? Would you ever sell the gods that you worship? But he had managed to hold his tongue.

'Look, we'll give you four or five rupees for that,' they'd offered, drooling at the sight of the meat. But Vasu had walked on without a backward glance. His irritation had mounted with the heat of the noonday sun, his feet burned in the hot red dust and the voices of the woodcutters grated on his nerves as they asked him again and again to sell the turtle.

'Has the *puja* been done?'

Vasu came back to his senses. There were two elderly men from the village standing before him.

They placed the turtle ceremoniously on a platform and decorated it in a manner fit for worship. The children were dispatched to fetch flowers. Meanwhile Vasu had a bath at the well, and as he dried himself he told his wife that he was going to worship the turtle, half expecting her to provoke another lengthy argument. But his wife merely indicated that everything he needed for the rituals was laid out already.

'What about the *prasad*?' she asked quietly.

'Prepare something from that coconut left over from yesterday,' he said. He then performed an elaborate *puja*, worshipping the turtle with all the rituals normally reserved for the deity, in the inner sanctum of the house. Prasad was distributed to the children and everyone dispersed, only to reassemble at twilight to gape at the turtle all over again.

In the neighbouring houses fireplaces were lit to prepare the evening meal. But in Vasu's kitchen no fire had been lit since morning. His wife sat leaning against the wall, silently immersed in mending a fishing net. The child sat beside the turtle as it had done all day. Vasu squatted on his haunches with his head in his hands, hoping that his wife would break the silence. But ever since the quarrel in the morning she had withdrawn totally into herself. Vasu stared at the hearth, at the cold ashes which seemed to taunt him and laugh at his helplessness. The container on the shelf, empty of rice, seemed to float down and pin him to the ground. The pot on the hearth seemed as empty as his fortunes, the black stand that supported it waiting for his flesh to be roasted on it.

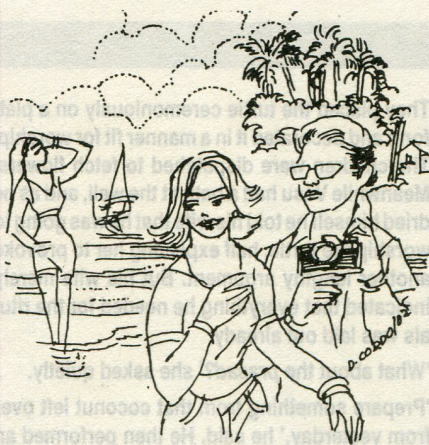
Abruptly, Vasu sprang from his hunched position and tucking the loincloth tightly about his waist, pushed his way through the crowd of children gathered around the turtle. Grasping the rope tied around the creature, he hoisted it up into his arms.

'Where are you taking it?' people around asked in consternation.

'To the sea ... to release it there ...'

He strode away purposefully, the turtle no longer weighing him down. Striding through the darkness, he reached the camp where the woodcutters were sitting, puffing on beedies. He flung the turtle down beside them and stood there silently with his right hand outstretched. The woodcutters whispered to each other, their white teeth gleaming against their dark skins as they smiled broadly. One of them got up, and drawing out a single two-rupee note from the pocket of his shirt that hung from a branch, placed it silently on Vasu's palm.

Vasu set off, his cheeks burning as though someone had slapped him. His ears seemed to reverberate with the buzzing of the woodcutter's saws even though the sawing had stopped long ago. Clutching the money tightly in his fist, Vasu made his way to the shop to buy rice.



The packaging of Goa as a major international tourist destination is still actively underway, even though the number of tourists visiting Goa has exceeded the region's carrying capacity, bringing about a steady and relentless degradation of the natural environment as well as a deterioration of the social and cultural fabric. Undeterred, our ministers continue to make foreign jaunts, wooing more tourists to visit Goa. As if this were not bad enough, the new thrust of the tourism promotion efforts is on high-paying luxury tourists who place considerably more burden on the infrastructure per capita than ordinary tourists.



Moon light party at Anjuna

Tourism

Disgraceful proposals like offshore casinos and golf courses are being promoted all over again.

The question is: Will good sense prevail? Will one more area of the planet, renowned for its exquisite natural beauty, be covered in ugly concrete to be readily discarded once the colonizing, consuming tourist is disenchanted with what it has become, as a result basically of efforts to please her or him? Do the tourism promoters and tourism developers care about what happens to the people and environment of Goa?

Tourism, as we shall see, continues to place a tremendous strain on the infrastructure and scarce resources of Goa, with water, food, electricity and other resources being diverted to the tourism sector at the cost of the local people, aggravating social injustice. The garbage and sanitation problems created by tourism are a cross borne by the citizens of Goa at large.

At the same time, the image of Goa and the Goans has taken quite a beating at the hands of advertisers. Hordes of domestic tourists still come to Goa in search of women whom they have been led to believe are easily and freely available. And cheap and plentiful alcohol, of course, continues to be one of the major selling points, resulting in tourists coming here with the express intention of getting drunk.

Young people growing up in an unnatural atmosphere like this are bound to have their sense of values distorted; cultural degradation is a living reality in Goa with many young people mesmerized by the superficial glitter of the life-style of Western tourists. Liquor companies are sponsoring every event from youth festivals to formal balls to expand sales and maintain production.

Tourism has come to dominate the economy and landscape of Goan life in a way that no other activity does. Tourism is ubiquitous and except for the fortunate few in the interior talukas, no Goan can live without acknowledging its existence and importance, or being affected by its fallout.

The costs continue to mount. Goa now receives more tourists per annum than its total resident population—the strain this places on scarce resources and infrastructure is enormous. Combine these large numbers with a greedy tourism lobby backed by a corrupt government and the result is before our eyes: complete and total anarchy, absence of any norms. Leave alone coming out with a coherent long-term policy on tourism, the Government has failed to even regulate the sector as per existing laws. When it appears that something may be done, greed triumphs and the unhealthy activities of the tourism lobby are allowed to proceed unchecked.

The 'tourism lobby' which we have referred to is a far from homogeneous group. The leading lights (and the worst offenders) are the large luxury hotels. Then come the medium-sized establishments, which have, through shortsighted competitive greed, succeeded in converting the tourist belt into a hell-on-earth. And last of all are the ordinary people, largely Goans—employees, waiters, receptionists, taxi drivers, shack owners, petty merchants, labourers, businessmen and small hoteliers—who strive to eke out a living on the crumbs they receive from the tourism banquet.

The needs of this last group have been given the least importance when developing tourism. Thus we find

today that the economic benefits are skimmed off by the powerful large and mid-sized hoteliers, leaving little for the mass of people. It is in such a scenario that Goans are asking themselves whether the price they are paying is worth it. And there appears to be growing consensus that it is not.

This price is not merely that of a lost economic opportunity. The balance-sheet has a massive component of environmental degradation of all kinds: despoilation of the fragile coastal belt through uncontrolled development, creation of mountains of waste and displacement of people from traditional occupations, in addition to the social and cultural dislocation which tourism causes.

DEVELOPMENT OF TOURISM IN GOA

In the pre-liberation years, there was no tourism to speak of in Goa. Under an oppressive Portuguese regime that stifled all initiative and did nothing for its people, Goa was not a place outsiders cared to visit. The main visitors were those who had migrated out of Goa (or whose forefathers had) in search of a better life. They continued to be bewitched by the spell of Goa and assiduously maintained links with the homeland. But all these visitors were not tourists—they were locals. No special infrastructure or facilities were required for them, they blended into the local population to which they belonged. The only other visitors were functionaries of the Portuguese Government, who again were not tourists, but employees taking up their posting soon to go away.

Things began to change after the liberation of Goa brought this tiny enclave into mainstream national and international consciousness. Intrepid souls began to discover the charms of Goa and word began to spread. Infrastructure lagged behind though, and those tourists who made it to Goa had to cope with the meager facilities offered by a few small hotels and guest houses, usually run by locals.

The turning point (or the beginning of chaos, depending upon your point of view) came in the late 60s when Goa was discovered by the hippies. Over the next 10 years, the flower children flocked to Goa in droves. Short of money as they were, they engaged in the tourist equivalent of slumming. But the publicity that accompanied the discovery of Goa by the hippies ensured that the potential of Goa as a tourist destination sank into the consciousness of the tourism sector as well as tourists in India and abroad; they were the pioneers of the invasion that was to follow and in fact made it possible. Hotels increased rapidly in number, largely small and medium establishments run by locals, soon to be followed by the first few luxury hotels.

There was a steady growth for some years after that. The hippies continued to come but there were also increasing numbers of middle and upper-class tourists, both domestic and foreign. And in the mid-70s, the State Government woke up to the realisation that here was a sector set to burgeon rapidly. The political class licked its lips in anticipation. With support from the Central Government, which had a policy of promoting the

tourism industry, the charms of Goa as a tourist destination began to be vigorously pushed. Internationally, the first signs of the globalisation of the industry were also visible. Tourism was being pushed as a 'zero-pollution industry', and global capital exhorted developing countries to develop their tourism sectors while ensuring that control over the industry remained in the industrialised West.

By the early 80s, things were beginning to get out of hand, causing much disquiet among the thoughtful. The tourism industry expanded rapidly, flouting all norms and regulations. Pollution began to rise, and the signs of cultural disturbance became noticeable. The Government usually succumbed to every pressure put on it by the tourism lobby. The occasional halfhearted attempt to regulate the sector and create a policy was junked almost before the ink was dry on the document.

By the mid-80s, protest movements against tourism began to build up. They raised issues like pollution, cultural debasement, social exploitation and uncontrolled consumption of scarce resources at the cost of the people. Organisations like JGF (*Jagrut Goenkaranchi Fauz*) were at the forefront of these protests.

It was at this time that the profile of the average tourist began to change. The hippies withered away, to be replaced by backpackers who did not have even the rudimentary social conscience of the hippies. Middle and upper class tourists increased in number. And the tourism lobby rushed to satisfy their every whim, both real and imagined.

The evidence of pollution and environmental degradation, coupled with a dislocation of social and cultural values could no longer be ignored even by the Government. The response, however, has been either pathetic—halfhearted attempts at regulation and policy documents overflowing with platitudes—or hilarious, as in the attempt to woo richer tourists. When you are overcome with greed at the thought of the killing you hope to make out of promoting this variety of tourism, it is easy to forget that rich tourists place considerably more strain on resources than less affluent ones or that tourism which caters to the rich will have very little local benefit and disproportionate costs. Out of this stimulated forgetfulness spring proposals for golf courses and casinos.

In the 90s, the tourism sector has grown beyond reasonable bounds. The demands it has placed upon resources and infrastructure coupled with the pollution and destruction of the natural environment it has brought about threaten to plunge Goa into chaos.

The sewage, garbage and plastic waste, including discarded plastic mineral water bottles, litter every nook and corner of the coastal villages. Worse, serious social degradation is taking place in the form of acid parties and child sex tourism: these are emerging as major preoccupations of the category of tourist visiting the State.

It is essential that some rational thought be given to the whole issue right now—later may be too late. It would be wise to remember that just as there are limits to economic growth in general, there are limits to the expansion of the tourism sector in Goa. In fact, it would appear that they have already been reached. Further growth would actually be counterproductive; conversations with regular visitors to Goa indicate that the overdevelopment in the tourist belt has succeeded in making Goa increasingly



Garbage outside Tourist Hostel, Calangute beach



Deck chairs colonise the Calangute beach, making movement on the beach difficult for the public



Scene behind a five-star resort at Mobor

unattractive to tourists. At this rate, we will have hotels but no tourists, plenty of environmental degradation but no sustainable economic benefits justifying it.

Welcome to Goa!



FACTS ABOUT TOURISM IN GOA

The number of tourists arriving in Goa has gone up by leaps and bounds since the 70s. In 1981, (even prior to the arrival of charters) 4,39,000 tourists (both domestic and foreign) visited Goa. The numbers kept on rising steadily till the first 'charter tourism' year (1987) when direct flights were started from Germany to Goa by Condor. However, as can be seen from the statistics, the charters did not necessarily lead to any dramatic improvement or boom in the arrival of foreign tourists. Tourist arrivals are given in Table 1.

Foreign tourists in Goa amount to 11.6% of total foreign tourists coming to India and charter tourists to Goa account for 75% of total charter traffic to India. The number of tourists who come by charter flights is given in Table 2.

Table 3 indicates that 47.5% of foreign tourists come from UK and another 20% arrive from Germany, Finland, Switzerland and France. Only 3% come from the US and 1% from Japan. Visitors from the former colonizer Portugal are less than 0.2%!

From Table 4 one can see that the percentage of domestic to foreign tourist has changed from a ratio of 75:25 in early 90s to 71:29 more recently. This may be largely due to the fact that it is cheaper and more convenient to fly to Goa (and get cheap accommodation) from the UK or Europe than it is from the rest of India. The bias against

Indian tourists is still to be remedied despite the appearance of the Konkan Railway in 1996.

Recognising that the charters are a waste of time and money and actually a massive subsidy to European tourists, resort owners are now spending more time advertising Goa's virtues to high-spending Indian visitors. It will not be long before the charters find themselves told to go elsewhere. Even the government has admitted that charters do not mean serious business and are best replaced with *desi* guests.

The basic problem of tourism in Goa is that most of the foreign tourists appear during the winter season from November to January. Very few people visit Goa during the monsoons; as a result most tourist establishments work for only 6 months in the year (Oct. to April) and are forced to lay off their workers for the remaining 6 months.

Tourism in Goa therefore does not provide steady and uninterrupted employment and it is a common experience that after working for a few years in the tourist sector, most people are unable to cope with the interruption and try to move in to the other professions.

The maximum number of the tourists visit 4 talukas i.e. Tiswadi and Bardez in North Goa and Salcete and Mormugao in South Goa, so the benefits too remain only within these areas.

The contribution of the tourist industry to the Goan economy has increased substantially and is second only to mining. In 1994 the contribution was 11% to the State GDP, 7% to employment and 7% to total revenues.

Table 1 : Tourist arrivals

Year	Domestic	Foreign	Total	% increase
1990	776993	104330	881323	-
1991	756786	78281	835067	-5.25
1992	774568	121442	896010	7.30
1993	798576	170658	969234	8.17
1994	849404	210191	1059595	9.32
1995	878487	229218	1107705	4.54
1996	888914	237216	1126130	1.66
1997	928925	261673	1190598	5.72
1998	953212	275047	1228259	3.07

Table 3 : Foreign Tourists (1997)

Country	No. of Tourist	% arrivals
United Kingdom	124348	47.5
Germany	25190	9.6
Finland	10233	3.9
Switzerland	9506	3.6
France	8924	3.4
Sweden	3386	1.3
Italy	4454	1.7
Austria	1412	0.5
U.S.A.	7726	3.0
Canada	2969	1.1
Australia	3345	1.3
Japan	2673	1.0
Holland	2305	0.9
Denmark	2885	1.1
New Zealand	1435	0.6
Greece	388	0.2
South Africa	530	0.2
Russia	391	0.2
Portugal	630	0.2
Others	48943	18.7
Total	261673	100.0

Table 2 : Charter Tourists

Year	No. of flights	Tourists arrival
(Oct. to April)		
1990-91	41	5815
1991-92	121	17102
1993-94	259	39871
1994-95	313	59881
1995-96	337	75694
1996-97	282	73172
1997-98	350	88817
1998-99	356	90635

Table 4 : Tourist Traffic Flow

Year	% of Foreign Tourists
1990	13.43
1991	10.34
1992	15.68
1993	21.37
1994	24.75
1995	26.09
1996	26.69
1997	28.17
1998	28.85

Investment in the tourism industry has continued to expand. In fact, it doubled from Rs 15 million in 1986-1987 to Rs 30 million in 1996-97. Investment in starred hotels went up by 40% and in other hotels by 48%. Despite the fact that the industry has performed poorly in financial terms compared to other sectors and other industries, investment has continued to rise. One study indicated that in 1996 almost half the investment in the sector was in the hands of just 4 big hotels; the 8 largest hotels controlled 69% of all investment but the balance was made up by the smaller hotels.

Goa crossed the 1 million tourist figure in 1994. Today the State has a total of approximately 50,000 rooms of various categories (see Table 5). It is clear that the unclassified hotels and paying guesthouses are still the largest categories followed by the 1 star hotels with the five-star hotels coming in fourth place.

Up-to-date figures regarding the amount spent by tourists in Goa are not available. However, a 1994 Kirloskar study concluded that a domestic tourist spent equivalent to US \$110 during a stay period of 5 days whereas foreign tourists spent US\$ 590 over an average period of 9 days. This trend may be changing as more affluent domestic tourists are visiting Goa and the foreign tourist is increasingly supplied by the cheaper charter operators. It is a common enough experience in several tourism areas that the cheaper tourists often drive out the better behaved, more expensive tourists.

The decisive issue facing any tourism destination is the benefit-cost ratio. This has never been calculated in terms of the extensive tourism activity in the State of Goa. Eventually the calculations must be made extensive. Destruction of the environment on the scale occurring in Goa can only be justified if the returns from any industry are such that they lead to enhancement of prosperity, provision of employment and reduction of poverty levels, since poverty is described as the greatest threat to environment protection.

But even that argument does not match the demand for sustainable tourism which can only be ensured by protecting natural assets. This again is something that has been impossible to achieve, since at the present moment, the drive to earn money is paramount and environmental considerations are routinely set aside when it comes to constructing resorts and hotels for the trade.



Swimming pools have water while the public gets inadequate supplies for domestic use



Table 5: Approved Hotels (1998)

Description	No. of hotels	No. of rooms
5 starred deluxe	5	844
5 starred	2	259
4 starred	1	176
Heritage	-	-
3 starred	8	508
2 starred	14	677
1 starred	11	1025
To be classified	14	617
Total	66	4106
Unclassified	253	7888
Paying Guest Houses	1355	2500
Grand Total	1674	14494

TOURISM'S ENVIRONMENT PROBLEMS

The decision to designate Goa as a major mass tourism destination was taken in the mid-80s by the Central Government without considering any of the implications of the invasion by such a large number of tourists on the fragile environment of the region.

Normally economists will convey a Benefit Cost (BC) Ratio to examine whether the exercise would result any net benefit to the economy and society at large. Also mandatory would be an EIA, which would have considered various tourism options and then selected one or another area for development, keeping the environmental impacts in mind. Neither was the BC Ratio calculated out nor was the EIA conducted. The EIA is generally followed by an Environment Management Plan (EMP) which will enable the stakeholders to limit the environmental impacts and to conduct rehabilitation procedures where serious environmental degradation is a possibility. As of the moment, the authorities are not even thinking of an EMP.

The only recent document that has been prepared by a private agency is a Tourism Master Plan which is largely a tourism promotion plan in fresh areas of Goa, because the authorities are faced with the obvious and undesirable overdevelopment of the beach stretches.

It is not surprising therefore that because of its unplanned nature, the large-scale promotion of tourism in Goa has produced lopsided results, endangered the environment and ecology, causing permanent damage in some areas. All actors agree that the present trend is unsustainable. This is largely due to the fact that in order to cater to the increased demand, Goa's natural assets are being squandered in exchange for cash. Frankly speaking, without these natural assets, there is very little to offer to tourists who may wish to visit.

The major fallacy of the unplanned tourism scenario lay in the promotion of a string of five-star resorts. In the mid-80s there was a proposal to have 70 five-star resorts with one such resort for every kilometre of Goan beach. However, this proposal was strongly resisted and at present Goa has less than 10 resorts. Developers are getting wary of putting up any more because the existing resorts have become uneconomic nightmares.

Water problems — Tourism has generated a host of very serious environment problems. One crucial issue is the demand of the existing resorts for water. This is well documented. Water is supplied to five-star resorts by the Public Works Department at the expense of the majority of Goa's consumers who get less than the stipulated norm per day. (Several parts of Goa, like Pernem, have no water at all during the summer months.)

Water is however not a problem only for five-star resorts, but is also in demand by a large number of smaller resorts which have swimming pools. Though practically all swimming pools now routinely recycle their water, a significant quantity is still required for makeup water.

The demand for water in all those resorts that have lawns and gardens is very high. Sand allows only certain types of plants to survive naturally during the 8 months when there is no rain. Sand dunes, for example, are

generally occupied by sand dune vegetation, which can survive through the long dry months solely on the basis of water received during the monsoon. Most hotels, however, insist on growing lawn grass and exotic species of plants. These species have never been intended to survive on mere sand. In order to do this, resorts cover the coastal sands with a thick layer of mud imported from hillsides. Even with this, the lawns require constant watering merely to survive.

As the Government is unable to supply the huge quantities of water required, tourism developers have only two real options, both of which have environmental implications:

1. To sink wells in the coastal zone. Withdrawal of groundwater from coastal aquifers within 500 metres of the HTL is specifically banned by the CRZ Notification. Except by manual use, all wells are prohibited within the 200 m. zone. Despite this, a large number of hotels continue to draw groundwater, and in some areas like Mobor and Sinquerim, there is already scientific proof that the withdrawal of such groundwater is leading to saline intrusion.

The Government has now got the Goa Assembly to pass the Groundwater Act to regulate the withdrawal of water in coastal villages. If implemented, resorts in coastal villages and industrial units in industrial estates

Lawns on the beach sands require import of huge quantities of mud and water to sustain exotic species



will find themselves desperate for water. But village folk might get relief.

2. The second option is importing groundwater from the non-coastal villages in the interior through the use of water tankers; thus, villages like Saligao and Sangolda have been facing acute water shortages largely due to such activities. Construction of wells in these villages is generally done with financial assistance from the Rural Development Agency. The person digging the well procures financial assistance on the grounds that he needs it for agriculture and for growing vegetables. Once the well is sunk, tankers regularly visit the well and the sale of water begins. The RDA, like all Government agencies, is never concerned whether the assistance

provided by it is being used for the purpose for which it was sanctioned.

Sewage from tourism—It is difficult to believe, though true, that the heavily developed coastal villages of Baga, Calangute, Candolim and Colva do not have any sewage facilities. Large-scale construction has been raised on the premise that septic tanks can deal with the solid wastes generated by the buildings concerned.

All the buildings were erected for local residents who generally use lesser quantities of water. Their use for tourists has ensured that much larger quantities of sewage and waste water are generated. Naturally, septic tanks and outflow pits have proved to be insufficient. In several parts of Calangute, sewage from overflow tanks has already contaminated groundwater aquifers. A study of groundwater in Calangute by Dr. Joe D'Souza of the Goa University is extremely well-known. It showed that most groundwater in areas tested was completely hazardous as it was contaminated with high counts of coliform bacteria.

Despite the fact that these villages generate a huge volume of revenue for the Goa Government, their sewage disposal requirements figure very low in the priorities of the Government. The PWD has recently generated a proposal for meeting the sewerage needs of Calangute and other villages in Baga. The Government however claims that it has no money to finance this scheme.

Noise pollution—The tourism industry does not generally thrive where there is noise. Tourists expect a peaceful atmosphere, general quiet and a sufficiently quiet atmo-

sphere which will allow uninterrupted sleep. However, many tourists who come to Goa come to party. They want to party all night. For several years, the police turned a blind eye to such activities.

As Goa became one of the world's recognised acid party centres, village environments like Vagator and Anjuna surrendered completely to high-pitched, monotonous Goa trance music, which invariably began at 10 at night and continued well beyond sunrise, sometimes till 9 am. The acid parties were supported on the premise that they brought a good deal of money and income to that part of the village population which was heavily dependent on tourism. This section, it appears, slept during the day to remain awake all through the night.

Despite two decades of tourism, however, only small segments of village communities are wholly dependent on it. Largely, it is only the coastal wards in Anjuna, Vagator and Calangute that depend on tourism. Even within these localities, many families make their living working in the non-tourist sector. Village communities have routine activities including running of schools and the conduct of examinations. Noise pollution associated with the acid parties continued heedless of the discomfort of those who are not concerned with the tourist at all. Besides the children and their educational requirements, the noise pollution affected nursing mothers, working people who needed their night's sleep, the aged, the sick etc. No consideration was shown to any of them and since the acid parties are generally organised by well-known mafias in close links with the police and the

Mass Tourism Destroys

At the same time that Goa reels under the impact of massive change, it is being vigorously promoted as a tourist paradise. In such a situation, ironies abound. While vast tracts of the territory are being turned into a moonscape, it is being touted as a 'lush garden' and 'almost miraculously unspoiled'. As the interesting Luso-Indian architecture of the towns is replaced by concrete blocks of exceptional ugliness, Goan urban charms are advertised as 'nearly Mexican'. As politics, pollution, mass media, and the increase of population pose mounting problems, Goa is referred to as a 'place outside time'.

But the ironies of tourism are not limited to the dubious claims of brochures. Because the big Goan industrial families have not gone into the hotel business in a serious way, chains operated by Indian corporations from other parts of the country have taken over. Construction of huge luxury hotels has resulted in the alienation of land from traditional owners, the disruption of village life, tremendous inflation (because of the high prices that foreigners and rich Indians are willing to pay), and the commercialisation of local culture.

Goa has been a tourist destination for many years, but only recently has it begun to suffer from mass tourism, the sure destroyer. Over the years there have been essentially three types of visitors to Goa. First, there were the Goans



Garbage from starred hotels is dumped casually by roadsides

returning home on leave from their far-flung diaspora—reaching floodtide when the Mumbai schools and offices let out for the holidays. This type of tourist brought new ideas and goods into Goan society, but was not disruptive. A few years after Liberation, Goa was discovered by disaffected, adventurous Western youth, loosely termed 'hippies'. Their nudism, drugs, and rock music shocked Goan sensibilities. Nevertheless, while the appearance of some seaside villages changed, the local people remained in control of the tourist trade, and socioeconomic structures were not altered drastically.

It is the third type of tourism which has brought about severe economic, social, and cultural

dislocation. This is the more recent mass tourism by well-to-do individuals or groups who want little or nothing to do with Goan life—visitors cocooned in luxury hotels built on former village land, staffed by former fishermen, toddy-tappers, and farmers, and supplied by the 'more reliable' sources outside the territory.

The greatest irony of all is that even the official advertisements urge people to visit Goa now, before it is spoilt. It seems almost inevitable that the burgeoning tourist 'infrastructure' will overwhelm and destroy the very place the tourists are coming to see.

Robert Newman

administration, any person wishing to complain about them was bound to be intimidated or harassed.

The charter tourists generate noise pollution of a different sort. A large number of these tourists from England, who belong to a particular class of beer drinkers, would be found in swimming pools in the middle of the night making an unholy ruckus, almost always fully drunk and conducting themselves in a manner in which they would not dream of behaving while in England itself.

In Calangute, for more than two years the Little Flower High School faced uncontrolled noise from the Brisa Leisure Resorts. The school moved the Excise Commissioner's office and succeeded in getting the liquor licence cancelled. Thereafter it had to litigate the issue at the High Court and Supreme Court levels to put sufficient pressure on the Brisa Resorts to behave, in view of the fact that the resort was immediately adjacent to the school. It is to the credit of the nuns from the school that they fought a determined fight and eventually succeeded.

The other type of noise pollution was associated with a new brand of public entertainment being set up in most of the tourist spots by liquor companies. These events imported a new rage of the time, DJs, who spent fortunes in promoting themselves and their image and involved huge investments in massive amplified speakers which would blast music over several kilometres.

The Government was aware of this abuse but did nothing. It granted permissions to parties to organise these events 'from the acid parties to the liquor bashes' but never enforced either the conditions in the letters of consent, nor did its officials visit problem sites when complaints were filed by vigilant citizens.

Eventually, as always, the High Court had to intervene and it passed an order that there would be no further noise between 10 pm and 6 am. The High Court based its order on the Noise Pollution Control Order issued by the Ministry of Environment and Forests which had come into force but was being studiously ignored by the Goa administration. Eventually the Government had to concede that the Noise Pollution Control Rules 2000 issued by the Ministry of Environment would prevail over its own legislation which in fact was nothing more than an adoption of an obscure statute imported from the state of Madhya Pradesh. During the hearings on the Writ Petition, the Government finally filed an Affidavit laying down the procedures for enforcement of the Noise Rules and demarcating the zones in the State of Goa for enforcing the Notification. A few months later the Supreme Court passed a strict order directing the authorities to implement the Noise Pollution Rules all over the country in the light of the Ministry of Environment's Noise Rules Notification. No exceptions could be made. With that, acid parties and liquor

bashes with DJs at the helm came to an ignominious end, bringing some measure of relief to those who had been suffering from the curse of noise pollution.

All this could have been avoided if the Government had been concerned with the interests and well-being of all those citizens, instead of bowing down repeatedly to the pressures of a few powerful individuals who insisted that they had a right to make noise in the interests of tourism.

The Privatisation of Beaches —The tourism industry quite clearly believes that nature has been created solely for it to exploit for profit; the needs and rights of ordinary citizens carry little weight before this overwhelming imperative. There have been repeated cases of the tourism lobby using devious means to privatise public resources. One of the areas on which they have focused their efforts is the takeover and *de facto* privatisation of common beaches.

Legally, beaches belong to the State. The State holds these resources in trust for the public. Hence, such resources cannot be privatised. The right to enjoy them as part of the natural environment is protected by the

Fences erected by resorts on hitherto open beach areas restrict public access to beaches.



Constitution. This tragic circumstance (from the viewpoint of the tourism lobby) means that the hotels on the coast cannot mark off a section of beach for exclusive use by their customers.

But, undeterred, other means have been thought of to corner the beaches adjoining resorts and hotels for the exclusive use of their patrons and to keep the local people out. The most popular of these is to purchase all the land from which the beach in question can be accessed. This prevents those who are not guests of the hotel getting to the beach, and the hoteliers' objective is achieved.

This method is not foolproof, though. Much to the chagrin of tourism promoters, the law provides that a

right of way must be left free and open for access to the beach. And it is here that the true colours of the hoteliers can be seen. The access provided is invariably narrow and over difficult terrain, acting as a deterrent to those who may wish to enjoy the pleasures of the beach without being a guest of the hotel concerned.

A number of cases have been fought over the years to ensure that hotels provide good access to the beaches fronting their hotels. The most notorious case is that of the Cidade de Goa, which for years has got away with blatantly privatising the Vainguinim beach. The Government has aided and abetted such activities and merrily used its machinery to enrich private promoters at the cost of the general public. At every turn, the hotel has sought to circumvent the requirement of providing access.

The Vainguinim beach is a public resource which has been utilised by ordinary citizens from all parts of Goa for recreation for at least a century now. There are in fact ramps leading to the beach which were meant to provide access to the public. One of the conditions of the original hotel project was the provision of a direct public access to the beach with a parking lot for the public. This access was scuttled by the hotel and all attempts to restore it have to date proved futile.

In 1983, the hotel owners decided to create an extension to the existing hotel building. For this, it was necessary to acquire two plots of land adjacent to the hotel in order that the hotel would own a contiguous strip of land parallel to the beach. The owners were unwilling to sell. In Goa, these are minor hurdles if you are a tourism

promoter. The Cidade got the government to acquire the land under the Land Acquisition Act claiming that this was for the purpose of providing recreational facilities for the public! Our pliant government, which should be protecting the interests of the public, obligingly acquired the land and handed it over to the hotel.

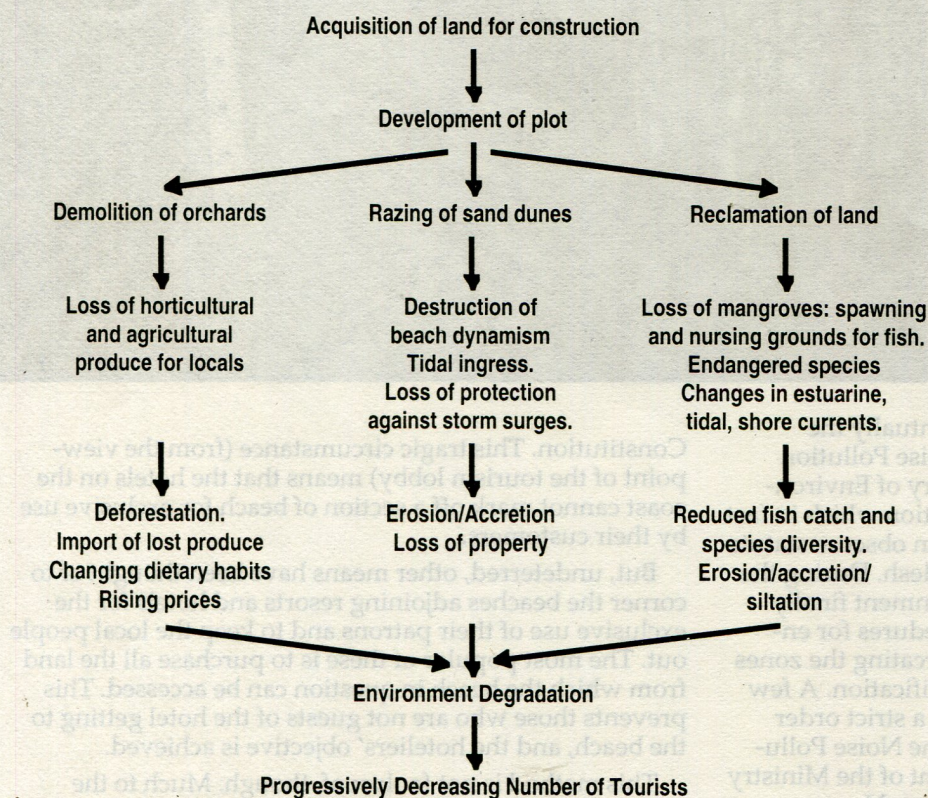
Predictably, no recreational facilities for the public ever materialised. The hotel claims, though, that the recreational facilities of the hotel are open to the public—on payment of a massive fee, of course! A wall was constructed encircling the land and the public was deprived of access to the beach. The *mala fides* of the hotel are clear from the brochures advertising its claim of having a private beach—a legal impossibility.

The problem, though, is that the access, once provided, needs to be repeatedly used by members of the public to ensure that it stays open as per existing norms. A right needs to be enforced by regular usage. This villagers often neglect or are too timid to do.

Other strategies are also employed if access is provided or the lay of the land is such that access cannot be completely blocked off. It is quite common for the security staff of hotels along the coast to approach people on the beach and tell them that it is a private beach and they should leave. If people refuse, the security staff are known to behave in a threatening fashion.

What is happening with the beaches is happening with every other public resource. Piped water is being increasingly diverted to hotels, while traditional wells get polluted from the sewage generated by the irrationally

Trends in Ecosensitive Coastal Areas



Source: *Tourism & Environment* by Kalidas Sawkar, Ligia Noronha, Antonio Mascarenhas & O.S. Chauhan

Tented Accommodation

The Goa Coastal Zone Management Authority, conscious of the gross damage already inflicted on Goa's prime tourism resource (the beaches) by ungainly cement concrete, has now taken a decision to recommend that new resorts consider housing their guests in tents. We hope that this recommendation will be increasingly enforced. The conflict between RCC construction and the beach structure is so well-known that it does not require any further debates. The print media, for example, recently showed a hotel being brought down on the Spanish coast.

What is more difficult to deal with is the gross mismatch between tourism developers' fantasies and the expectations of tourists themselves. The majority of people who visit Goa like to travel outside the hotels, walk on beaches, visit heritage sites. They are not too much concerned with spending all their money on staying cooped up in RCC rooms.

Entrepreneurs in south Goa have done well for themselves by putting up temporary cottages made out of woven coconut leaf, bamboo, and even tents, which the tourists love. These structures do not require heavy investment and therefore do not involve heavy losses either. Their impact on the beach structure is practically non-existent. The future of tourism in Goa will lie increasingly with those who make ingenious use of such earth-friendly materials.

constructed soak pits and septic tanks of the hotels. Ordinary citizens are quite often made to feel unwelcome in many tourist areas. The day is not far off when the best sections of Goa become reserved for tourists only, with the local population kept out by guile or force.

Food Festivals — The Tourism Department of the Government of Goa has, for the past few years, been organising so-called food festivals on the beaches ostensibly with a view to promoting tourism. But visits to these festivals indicate that they are more in the nature of liquor festivals with a view to promoting consumption of alcohol, with a good half of the stalls being devoted to this, and advertisements for liquor being the most visible feature.

To add insult to injury, these brazen alcohol promotion exercises take place on Goan beaches and the resultant litter renders the beaches unfit for use for months. The 1997 Food Festival at Miramar beach is a case in point; the festival proved to be a nightmare for residents of the neighbourhood. Many of the sponsors of the festival were liquor companies and a good half of the stalls were serving alcohol. The blaring music and noise were bad enough, but residents of the area had to cope with drunken revellers unsteadily wending their way homewards, tossing their empty bottles onto the beach as they departed. And after the festival, when the People's Movement for Civic Action (PMCA) studied the situation of the beach, they found loads of rubbish, much of it harmful, toxic and non-biodegradable. Since the sand keeps moving, much of the rubbish had been buried in the sand, doubtless to be found by some hapless individual coming to the beach for a relaxed evening.

Upset at this desecration of the beach, the citizens organised protests aimed at ensuring that such festivals do not take place on the beaches. The overwhelming public support forced the Government to call all groups to the conference table. The final consensus arrived at after consultations, which included even the tourist trade, was that the festival would not any longer be held on the beach. A plan was mooted to shift the festival to Patto, but this plan fell through.

Surprisingly, the Herald group of newspapers which had hitherto supported the struggle of the Miramar residents, decided to organise a 'Kiddies Festival' on the beach. Some kiddies festival—the sponsors were the United Breweries. The liquor companies were back to their usual games, this time under the laudable pretext of staging a festival for children. 'Catch them young' seems to be the motto—maybe the kiddies would be given a drink to wash down their cake.

The PMCA and the Goa Foundation urgently petitioned the High Court against the festival. The Court not only ensured that liquor was kept out of the picture, but

also laid down regulations regarding cleaning of the beach. The festival was closed by 10 pm every evening and garbage systematically removed. The *Herald* questioned the PMCA and Goa Foundation, saying that these wet blankets were preventing children having some fun—they conveniently neglected to mention why liquor companies had been roped in as sponsors. The whole exercise proved to be a blessing in disguise as the Court widened the scope of the petition to include the issue of cleanliness of the other beaches of the State as well.

Eventually, the government filed a detailed scheme to be carried out by the Tourism Department for the regular cleanliness and care of Goa's beaches, but took its time to implement the scheme. The first contractors to collect garbage from beaches and shacks were appointed only in early 2002! However, even those contracts are yet to bear fruit, since the garbage largely remains unattended on the beaches.

In 2001, the government came up with a proposal to privatise Miramar beach. The proposal generated an astonishing uproar, forcing the government to appoint a one-man committee headed by Dr. Nandkumar Kamat.

Baina: the dirtiest beach in Goa



Dr. Kamat predictably vetoed the proposal, finally opening the door for NGOs to get fully involved in the cleanliness of the Panjim beaches. We hope them all success in their endeavour and hope they produce a successful model for the management of other beaches as well.

Garbage from tourism — Nobody, not even the NGOs, predicted the problems of garbage that tourism would kick up in this small State. Most of Goa's prime beaches are located in panchayat areas, where garbage collection and handling systems are nonexistent. The results of a decade of tourism in all the coastal villages, from Palolem in the South to Arambol in the North are there for all to see. Almost ubiquitous is the discarded plastic mineral

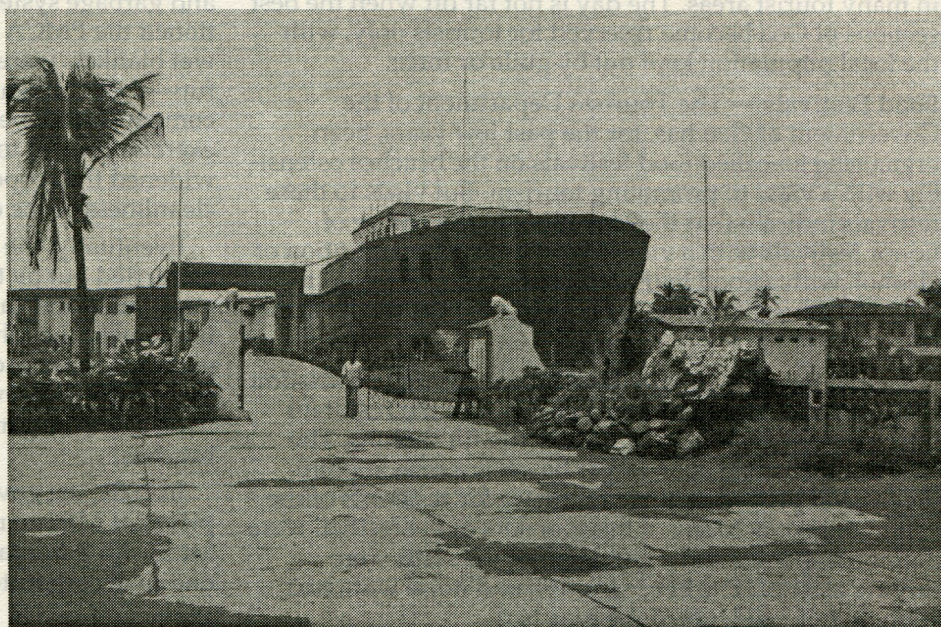
Golden Goa

Historically, official Goan culture has tended to be represented as that of the Catholic upper caste elites, being symbolised by the state's Portuguese architecture, and the food, dress, and leisured life-style of the elites. It is these symbols which the tourism industry uses to market Goa, and in so doing, reinforce a nostalgia for colonial times. The State Government and the tourism industry have appropriated the colonialist 'Golden Goa' image and recreated Goan ethnicity for the consumption of tourists. Goa's Catholicism, colonial past, and 'Indian' characteristics provide an image of remoteness and exoticism for the western tourist to enjoy. Indeed, even a cursory glance at tourist advertising for Goa will find numerous references to Portuguese colonialism. Hence a 1996 Cosmos tourist brochure speaks of Goa as 'carved out of the Indian subcontinent by the Portuguese', while Goa's Department of Tourism (1996) brochure uses colonial referents to advertise various luxury resorts. Thus in the Fort Aguada Beach resort 'everywhere there are reflections of Portuguese art', the Majorda Beach Resort 'has a distinct Portuguese touch', and at the Sarovar Park Plaza Resort 'the elegant architecture takes you back to colonial times.'

Moreover, Prabhakar Angle cites a tourist guide supplement of *The Week* (March 27, 1994) which carried a quote by the chairman of the Leela group of hotels, stating that Goa 'is a small replica of Europe's Latin culture on the Arabian coast'. Angle goes on to cite various examples of Indian media representations of Goa as comprising only Portuguese cultural characteristics. He notes, 'Within a few years of liberation, Goa started being projected as 'Rome of the East', 'a westernised society', 'a predominantly Catholic state having a culture markedly different from that of the rest of the country'.

Attendant upon these images is the notion that Goa embodies a '*sossegado*' way of life, i. e. one of ease, relaxation and quiet, which also implies servility and passivity, politically and otherwise. Thus, Ferrar, in a copy of *Muzik* magazine, states that 'the Portuguese ... brought a cosmopolitan attitude which has led to Goa's characteristic tolerance and easygoing pace', while a worldwide brochure speaks of 'a delightfully calm and unhurried way of life', where 'the pace of life continues to vary from slow to dead slow'. Meanwhile, a Thomson travel brochure refers to Goa's 'laid back life-style' providing 'the perfect setting for lazy days in the sun'. The Taj group of Hotels affirms the notion of '*sossegado*' when it states 'Of course, you could indulge in every Goan's favourite pastime—doing nothing. Magnificently.'

This framing of Goa in a golden past also takes the form of what I would term 'Goa Rustica', a celebration of an idealised rural Goa. Hence in the *Resorte Paraíso de Praia* (located in Calangute and run by Asiatic Holiday Resorts) a 'Goan Village Scene' was planned for the 1998 season.



The lobby of the Dalmia Resorts is a ship commemorating the vessel of Vasco-da-Gama

Twenty huts were to be built in the resort depicting 'typical' Goan village scenes imaged in human statues (e. g. of weavers, cobblers, fishermen, etc). Also to be included were live demonstrations of fishermen, toddy tappers, potters, and Goan folk dancing (personal communication by Asiatic Holiday Resorts Staff, August 1997). Such portrayals take the notion of 'staged authenticity' to its farcical conclusion. Goan village life, having been removed to make way for resorts such as the *Paraíso de Praia*, ironically vies for ascendancy with petrified culture: an ossified image of Goa appropriately set in stone.

Gendered Goa: Another facet of the imaging of Goa for tourist consumption is that of its gendered character. In a majority of tourist literatures, Goa is characterised as female, and is sold to an imaginary male consumer. Both the Government of India's tourist brochure on Goa, Goa's tourism departments, and the large hotel chains have used bikini-clad women in their advertising in order to sell Goan tourism. Hence, a Majorda Beach resort advertisement depicts young women in bathing costumes, with the caption 'just the minimum clothes will do', while an advertisement for the Oberoi Bogmalo Beach Resort (now Park Plaza Beach Resort) invites the tourist to 'rediscover your wife'. As the women's collective Bailancho Saad has noted, it is not that women wear bikinis on Goan beaches, and at hotel poolsides, that poses the problem, but rather that these images are the ones that are promoted by the tourism lobby as representative of Goa.

Such images are the product of the commodifying male gaze, which is cast upon the object of its desire. Hence, in the 1993 Berlin Tourism Fair, a Government of India audiovisual display depicted two Goan beaches with an erect nipple of a white woman's breast sandwiched between them, while

a 1996 Thomson travel brochure states 'what could be better than ... watching the local people in their colourful saris wander down to the beach'. Such images and words intimate that it is the (male) tourist gaze upon women which provides some of the exotica for the consumer, or indeed, that there is the imminent possibility of sexual encounters. What is of concern to activist groups in Goa is the effects that such representations have upon tourist behaviour in the state. Bailancho Saad has argued that with an increase in such gender-marketed tourism, Goan women, and indeed, western women, have been subjected to increased sexual harassment, sexual violence, and prostitution. Such dangers to women are not reduced by tourism marketing that represents Goa as a land of 'wine, women, and song', or when foreign reporters such as Lindsay Mackie, of the UK newspaper, *The Guardian* advise: 'you can leave your guilt behind at the moment when you travel and indulge in your wildest fantasies in Goa'.

In addition to these more blatant forms of gendered commodification are several other forms that occur upon Goa's beaches. First, there is prostitution which is organised through some of Goa's hotels. Second, there are the 'beach boys'—boys or young men who independently enter into sexual relations with female (and occasionally male) tourists in exchange for economic benefits. According to one piece of research (anonymous on the authors' request), certain single female tourists appear to view sexual access to local men as an integral part of the experience that they consume on their 'exotic' holiday. Here, this imaging of Goa as an exotic 'other' reverses the gendered image of Goa as female. Indeed, within such relationships, it could be argued that some female tourists are able to use their greater economic power to

indulge their racialised sexual fantasies while away from home, imaging Goa as 'ero-exotic'. Third, Goa has witnessed an increase in sex voyeurism, especially from domestic male tourists. This takes the form of 'ogling' of western women on the beaches, asking them to pose for photographs, or taking photographs of them topless without their permission. A contributing factor in this phenomenon has been the increase in the number of western women who sunbathe topless on the beaches and form casual sexual relationships with local men. This further 'sexualises' Goa and also reinforces the general stereotype that non-Goan Indians hold of Goa as a westernised and liberal state.

Goa as 'other': Drawing upon the state's colonial past, and the gendered nature of tourist advertising, Goa is viewed from within and without India as a cultural 'other', one that is, at varying times - according to the targeted audience—exotic, easygoing, westernised, promiscuous, and alcoholic. Indeed, Goa is imaged as a place of tolerance, permissiveness, etc, that can be imagined as a terrain upon which tourists can project their fantasies, and do whatever they want, unconstrained by their own society's social mores. Hence, Goa is exoticised for the foreign tourist as a place of 'fun, frolic, festivals, and *fení*, and westernised for Indian tourists as a carefree place where males can indulge in sexual behaviour that would be prohibited elsewhere in India. For example, Angle notes that a *Times of India* article in 1977 stated that drinking was a way of life with Goans, while the Doordarshan programme, 'Surabhi', stated that Goa was a land of fun and fiesta. Such images are more recently articulated by Ferrar thus: 'Goa's reputation revolves around partying ... there's a vibe of adventure, freedom and doing what ever you like ... there are no limits here.'

As Rao notes, Goa had been constructed to serve as one of the world's pleasure peripheries, a

cultural space for the leisure consumption of tourists divorced from the needs and concerns of everyday life. The discourse of tourism focuses on 'going away' to places rather than 'going towards' them. Tourist destinations thus become the cultural thresholds where the tourist leaves behind his or her social roles, rules and norms. Such destinations become commodities where the tourist finds a timeless, workless paradise. Talking with western tourists confirms this. When asked why they have come to Goa, many simply refer to the state's 'idyllic' quality, while others, such as a group of young Englishmen whom I met, responded that 'Goa is a great place to party.' An Englishwoman, Sarah's comments were typical: 'I want to get away from everything and this is the perfect place. It is like paradise, and I am here for the culture.' Others, such as Stuart, an American, felt that: 'In Goa I can escape India. Goa is different because of the beaches.'

The imaging of Goa as different from the rest of India can be attributed, at least in part, to several factors. First, there is the 'hippy mystique' that still accrues to Goa's beaches. Although the heyday of the hippies (during the 1960s and 1970s) is long past, the association of Goa with 'hippies' remains strong—indeed, backpackers are still referred to as 'hippies' by local folk in Goa. Contrary to the glorification of the hippy experience in India by writers such as Odzer, the reality was a little more prosaic. Hippies were attracted to India by the cheap price and easy access to drugs, by a romanticised and exoticised image of India as more 'spiritual' than the west, and the disparities in wealth between their native countries and India, which enabled them to stay in the country for long periods of time on relatively little money. The fact that hippies congregated in Goa in the first place was itself due to an othering of the place as different from the rest of India, i.e. more liberal and tolerant of hippy behaviours. The image of Goa as a haven for hippies continues even to the present, as some

backpackers attempt to recreate the 'hippy experience' while in Goa (and elsewhere in India, for that matter)—through clothing styles, drug consumption, and more recently, through rave parties in a contemporary evocation of the 'Freak' past. Indeed, even some charter tourists in Goa for just a few weeks can be seen donning their tie-dye clothes and indulging—in drug and party tourism before returning to their office jobs—or the dole queue—in the west. In this sense, 'hippy' has become another sign to be consumed as an integral part of the 'beach' experience, and the otherness of Goa. This phenomenon is given further credence when domestic tourists include, as part of their holiday in Goa, day trips to Anjuna beach (once the epicentre of hippy life in Goa) in the hope of seeing and photographing hippies in their 'natural habitat'. The 'beach' (and by extension, Goa) has become, in part, synonymous for some tourists with a neo-hippy experience: sited (on specific beach locations such as Anjuna), cited (in travel brochures and travel guides such as 'the Lonely Planet'), but rarely sighted except in ritualised shadow-plays of the past.

Second, Goa's 'otherness' is continually stressed in travel literatures. For example, Finlay et al, writing in the widely used *Lonely Planet Guide to India*, state: 'Goa has a character quite different from the rest of India ... Roman Catholicism remains a major religion in Goa, skirts far outnumber saris, and the people display an easygoing tropical indulgence, humour and civility.' The chapter on Goa then devotes virtually its entirety to providing information about Goa's beaches. This representation of Goa is in part explained by the fact that it is particularly in Goa's old conquest areas (predominantly Catholic in cultural composition) where the tourist beaches are located.

Third, it might be argued that the imagined otherness of Goa comprises a mirror which reflects back upon the tourist's self image: they imagine themselves as 'different' or 'cool' because they have visited Goa's beaches, taken drugs, and attended acid and rave parties. Such experiences accrue a certain symbolic capital for tourists upon returning home. Further, while in Goa, western tourists are, themselves 'other'—an 'other' that is privileged due to the comparative wealth of tourists vis-a-vis the local population, and their 'whiteness'.

The role of tourism imaging within this process, has been to attempt to construct and fix the otherness of Goa within the western and Indian imaginary—although there are also hotels which eschew the 'difference' of Goa and sell familiarity to sections of the tourist population. For example, the Primrose Hotel at Sangolda, Bardez, serves roast beef and Yorkshire pudding lunches, and provides satellite television and bingo games every night for its patrons. We might term this the 'Costa del Goa' approach to tourism.

Paul Routledge.

From *Economic and Political Weekly*, July 22, 2000, pp. 2651-2652

Goa is in a permanent carnival mode, if we are to believe the tourist brochures



water bottle. Bisleri, Pepsi and Coca Cola have made their money selling safe water to consumers. They have shown scant concern for saving the environment. These are the big polluters. In Europe they have elaborate schemes for collection of plastic and PET bottles. In Goa they have none. Here they can pursue their desire for profits even if every *nallah* and gutter gets choked with their product.

In 1999, the Goa Foundation took a truckload of plastic bottles to the Bisleri plant at Tivim and dumped the empties in the compound of the company. Despite this, the company's behaviour has remained unchanged.

A large number of the products used in the hotels and resorts comes in plastic packaging including thermocol. This waste is simply discharged in the open environment or taken by the panchayat and dumped casually at the illegal garbage dump behind the Pilerne industrial estate. The garbage of the resorts in South Goa is dumped at Sonsoddo. The chickens are coming home to roost. Opposition is building up to the Pilerne dump yard and the Sonsoddo dump site is overflowing. The Curca dump site of the Panjim Municipal Council will now be filled up in just two years (or even less) because garbage from the Mapusa dump, shut down by the Chief Minister, is also being routed there. Despite this, the administration continues blissfully on, with no sense of urgency. In the meanwhile, finding and managing a dump site has become subject to stricter regulations with the Municipal Solid Waste Rules, 2000 issued by the Environment Ministry.

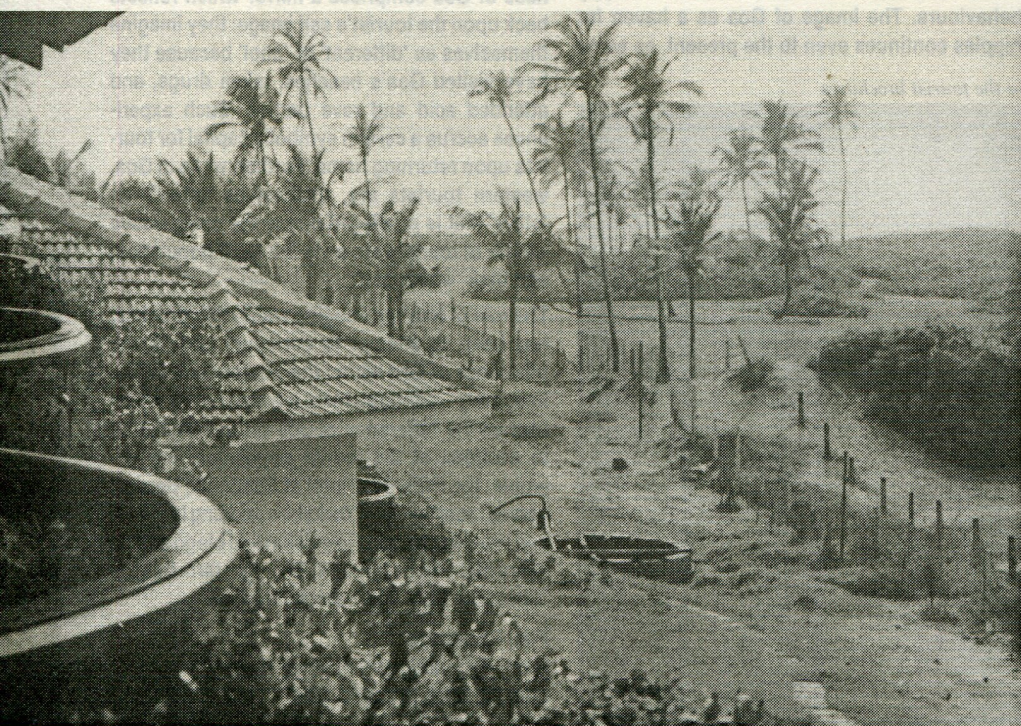
To be fair, some of the hoteliers are desirous of finding an ecologically sensitive solution. Villages like Candolim have tried to segregate garbage, have plastic bottles collected, but eventually failed since panchayats are really not equipped for these tasks at all. They have neither technical people whom they can consult, nor staff that can be kept exclusively for such tasks. The mounting piles of garbage are going to impact on our tourism

industry and the local environment in a manner more serious than the September 11 attacks on the WTC or the horrors of the *River Princess*. Managing garbage is not a single event, but requires a system of daily collection and handling. Nothing even remotely like this appears to be around the corner.

Concrete jungles — People who visited Calangute a decade ago and come in for a second visit are appalled at the manner in which the village has got transmogrified into a massive concrete jungle. Major parts of the village are more akin to Vasai-Virar in Mumbai. Multi-storeyed buildings, most of them constructed like monotonous apartment blocks, with no frontage or gardens or even parking facilities or proper approaches crowd each other. The roads have given way: the shoulders are covered with layers of loose mud and sand. Litter and overflowing garbage bins are to be found everywhere.

The construction boom in Calangute village has produced nothing but architectural monstrosities, some approved by the government and panchayat, some illegal. The government has not bothered to take steps to halt the degradation because the politicians in charge made money in granting the approvals. There is not a single political leader in the area (including the MLAs) who is interested in sustainable tourism. Today Calangute is a classic instance of a village destroyed by tourism. Colva is not far behind. Cavelossim, a coastal village, has been turned into a landlocked village after huge constructions have wiped out the horizon (including all the Cavelossim dunes) completely. If you wish to show any people anywhere how to destroy natural assets and raise concrete jungles in their place, bring them to Goa and show them Calangute, Baga, Anjuna, Colva and Cavelossim.

Resort construction in south Goa juxtaposed against sand dune topography



TOURISM PLANNING

Individual citizens in Goa have, for a long time now, been waging a battle with the authorities regarding the environmental degradation that has been taking place due to unplanned beach development. Unfortunately, these individuals are often completely isolated and are forced to fight a lone, losing battle. But until such time all such individuals and groups concerned about environmental issues come together, as they inevitably must, it is with these people that hope for the environment lies. Sarto Almeida is an example.

An architect from Margao, Almeida has been raising questions on a number of issues concerning the environment. Around 1980, he began to pressurise the government into adopting healthier development policies. The issues he has primarily addressed himself to are tourism and beach development, forests and town planning. In this section, we are presenting his suggestions on tourism. His views on town planning and forests deserve a separate section by themselves.

In 1980, as Chairman of the Southern Planning and Development Authority (SPDA), Almeida wrote a paper on 'Planning for the Development of South Goa', in which he made the following observations on tourism.

'South Goa is blessed with a very scenic coastline, much of which can be developed for tourism. But the present trend of having starred hotels at tourist spots needs to be changed as the benefits either in terms of jobs or economic gains for the community are minimal, but on the contrary there is a tendency for the prices of commodities to rise. Tourist development along the coast should be village based, i.e. planned as holiday villages and run by the villages where they are located. Whereas the government would help by way of loans, subsidies, managerial expertise and marketing, the complex would be owned and run by the village. In this way the full benefits of the tourist complex would filter down to the community.

'The advantages to the tourist are a comparatively inexpensive holiday and an opportunity to participate in the social and cultural activities of the people. This kind of tourist development will also ensure that the beaches retain their pristine beauty, with buildings in scale with and in harmony with the countryside. The location of these holiday villages could be between existing coastal settlements so that the inhabitants' free and easy access to the beach, traditionally enjoyed by them, is not curtailed. The road system to them will however need to be implemented first.'

In 1983, Almeida wrote a letter to the then Lieutenant Governor of Goa, K.T. Satarawala, which contained the following comments on tourism and beach development:

'Regarding coastal development, I was very happy to note that in your address to the Goa Chamber of Commerce and Industries last week, you proposed that tourism development should be restricted to certain locations only. A suggestion had been made earlier that the size of each of these located areas for beach development should be restricted to a 300 m length along the sea front and to a depth of 500 m inland. Along the Velsao-Colva-Mobor beach in particular, the tourism areas should be restricted to Majorda where a hotel is coming up, to Colva which is already developed, to Benaolim

where development has also taken place, to Varca where a hotel project, I believe, has been approved and to Cavelossim. It is also necessary that the coverage is allowable upto 25 per cent of the area of the plot and the height allowable upto two floors only.'

In his reply, the then Lieutenant Governor stated:

'About Coastal Development, I am of the same view as you, viz. that only a limited development should take place and that some areas should be kept as 'Wilderness Reserves'. These will have to be provided for in the Regional Development Plan. Such safeguards are particularly necessary as only 73 kms out of our small length of 105 kms of coastal are sandy beaches. It will be unwise to allow development on these 73 kms except in specified places.

'The built-up area on plots between 90 and 500 m setback lines should, I agree, be only 25 per cent of the plot area. It is only in those few cases where a plot extends from the high tide line up to the 500 meter line that 33 1/3 per cent may be allowed to be built upon. Incidentally whether the setback line should be 90 m or 500 m and what the position should be for estuaries has to be looked into.'

Almeida on beach development

'Over-development of some of the beaches, unwanted development or the wrong kind of development in others is resulting in the gradual loss of Goa's prime asset in scenic beauty. For example, Colva beach resembles a glorified urban slum unmitigated by the lack of planting either of coconut palms or other trees. The sands themselves during the season resemble Chowpatty sands in Mumbai with *bhelpuri-wallas* dotting the sands and music blaring from the stalls which may be all right for Mumbai but definitely not for Goa.

Suggestions:

1. No structures of any kind including temporary stalls to be allowed on the sands or within the 90 m wide strip from the high water line. This rule should be strictly enforced.
2. All beaches are for the general public and free access to them must be maintained by right-of-ways for the public. In cases of long stretches of beach like at Colva, these accesses should be spaced not more than 200 m apart.
3. No single tourist complex should be allowed to take up more than 100 m of the beach front.
4. Some area of the beach above the high water line to be compulsorily maintained as a tree shaded shelter for the use of the beach-goers.
5. a. On long stretches of beach, there should be a restriction on the number of starred tourist complexes that would be permitted. For example, along the entire stretch of Colva beach not more than five complexes should be permitted, namely at Majorda (existing), Colva (already developed), Benaolim (developed), Varca (proposed) and Cavelossim, and even if this number can be reduced, it would be advisable.
- b. Modest tourist cottages run by the coastal villagers themselves may however be encouraged.
- c. Subdivisions of land into small plots for commercial exploitation not to be allowed within the 500 m zone.

6. Certain beaches which have been the leisure areas for the local population must not be allowed to be developed for tourism. Tourists could always visit these beaches just like the locals. For example, Palolem beach and the island must be strictly left untouched and so too the end of Mobor beach. Recently, however, Mobor beach has been used for fish drying on a commercial scale and this should be totally stopped.

7. A proper and detailed survey of the whole Goan coastline needs to be done in order to set guidelines on where developments will be allowed or not and at what distances from the high tide line. The present guideline of allowing constructions after the 90 m strip from the high tide is not correct for some beaches or villages.'

These suggestions formed part of a detailed letter written by Almeida to the Lieutenant Governor Dr. Gopal Singh. Almeida was later appointed a member of the Government of Goa's Eco-Control Committee, set up to control development on beaches. In a meeting of the Committee he put forward these suggestions. Suggestions 1, 2, 3, 4, 5b, 6, and 7 were accepted. 5a was handed over to the Town Planning Department for detailed study. 5c was not accepted, but it was agreed that development restrictions may be imposed.

The story does not end here. It is an interesting comment on the attitude of the authorities and the lengths to which they are prepared to go to protect various interests, that these suggestions were not incorporated in the minutes of the meeting!

OPPOSITION TO TOURISM IN GOA

In May 1987, the then Union Minister of State for Tourism announced that the ban on construction within 500 metres of the High Tide Line (HTL) had been lifted and that by the end of the century Goa would see a grand total of nineteen five-star hotels. A week later, the Chief Secretary of the Goa Government announced that a Master Plan for tourism in Goa had been prepared and that the Government was setting up a Beach Development Authority for planning and controlling all tourism development.

When the Minister made the announcement that nineteen five-star hotels had been cleared for Goa's coastline, there were in existence already a number of starred hotels.

In North Goa were the Sterling Beach Resort at Vagator, the Taj Holiday Village and the Fort Aguada Hermitage. Panjim city already had the Mandovi Hotel and the Fidalgo besides the nearby Cidade de Goa. Further south were the Oberoi's Trade Wings Hotel at Bogmalo and the Majorda Beach Resort. There were immediate plans for a few new resorts including the Dalmias and Alcons at Cavelossim and another Oberoi hotel at Varca. In the extreme south was the Canacona Beach Resort at Agonda (still under construction) and Dr. Manu Shah's Nature Cure Hospital/Hotel at Xendrem.

The questions to ask now were: What was left for the Goan? And what did the expansion of tourism imply?

There is a major difference between five-star tourism as an industry compared to others. In a factory, material is brought from out, processed within the factory's walls

and then taken out again into the market. With tourism, you take a piece of land and the permanent resources that it is endowed with—clean water, natural greenery, white sand, etc.—and sell access to them for a profit. In order to do this, one needs as exclusive a control over the piece of land and its resources as far as possible.

The problem arises when the same piece of land and the same resources are not bare deserts but constitute the ecological niche of populations in the area.

Now this local population, in our context the honourable Goenkar, is as important in this democracy as almost anyone else. He also has a right to a source of income which may include tapping coconut trees, using the sands to moor his boats and the sea to catch his fish.

Inland Goenkars have also traditionally moved to the beaches on periodic excursions for purposes of health or entertainment, including school picnics.

Over the centuries, the settled agricultural population has worked out a major adaptation in the shadow of the massive dunes along the coast to successfully harvest essential commodities like rice, cashew and coconuts.

Now, all these Goenkars have a right to remain within this scheme of things. A right to be where they are and a right to demand from the government adequate resources to respond to a fresh stimulus like tourism in their own small way—as they have done, for instance, in the village of Calangute.

It seems, however, that tourism development, at least as envisaged by the Central Government, is based on an entirely different set of assumptions. These include, first, that the emphasis be laid primarily on attracting tourists from the western world or from the country's own super-elite. Another assumption seems to be that the only developers one can rely on for tourism promotion are large-scale business combines and certainly not the small-scale tourism industry. Thirdly, if one considers instances in the past, it seems quite obvious that the government would not hesitate to discriminate against the interest of local communities even if it means using obnoxious instruments like the Land Acquisition Act to enable the big lords of tourism and conglomerates to set up their extravaganzas.

So it is entirely to be expected that tourism in Goa soon degenerated into a war between the developers and sections of the local population, with government invariably backing the capitalist entrepreneurs.

Some of the battles can be enumerated here briefly:

1. At Loliem, villagers led by Goa's freedom fighters broke the gates of a huge walled property to assert and claim their ancient rights of access to the Xendrem beach. Government officials, from the Mamlatdar to the Collector and the Governor, colluded with the doctor who wished to open a 'Nature Cure Resort' in this area. The project died a natural death later, when its promoter also died.

2. At Agonda, the Seema Beach Resort was never able to come up even ten years after the first plots of land were illegally bought up by the company. This was due to sustained legal and other opposition from the village of Agonda and, more particularly, from the residents of Val Vaddo comprising toddy tappers. The project was also permanently salted thereafter.

3. At Mobor, the India Tourism Development Corporation (ITDC) had to shelve its plans to put up a five-star project, even after land had been acquired under the Land Acquisition Act by the company.

4. At Majorda, village level committees have had numerous protest meetings against the functioning of the Majorda Beach Resort.

5. Cidade de Goa faces a total of six writ petitions in the court on several grounds including access to the beach for the public and environmental violations.

6. The Taj Holiday Village remains the focus of hostility in the village of Sinquerim-Candolim.

7. The Sterling Resort at Vagator has faced opposition to its plans to restrict public access to the Vagator Beach.

8. Locals, particularly toddy tappers, faced harassment from the Leela Beach. The Resort was successful in reshaping the settlement pattern and even the roads in the locality to the detriment of the original inhabitants.

In each of these cases, the principal source of conflict has been attempts to deprive the local population of their traditional rights to the resources of the coastal ecosystem which they have depended on for centuries. These include pathways of access to the beaches, freedom to exercise professions including toddy tapping, drying of fish, traditional fishing and so on.

Over and above these problems are equally serious issues that affect not just people who made their living along the shores but also the general public within the State. The development of five-star tourism makes taxing demands on the general ecosystem itself. For instance, the water demands of five-star hotels, particularly for air conditioning, swimming pools and lawns, are so heavy that they can only be met by compromising access to public water for local citizens.

Today, for instance, while the larger part of the village of Candolim-Sinquerim does not have adequate and regular water, the Taj Hotels Group gets a sizeable amount of the precious liquid through a special pipeline from the public mains so that it can continue to maintain its lawns and other amenities. It must be reckoned an obscenity that while a large majority of the Goan population to undergo the rigours of trying droughts, often having to rely for small quantities of water on tankers, five-star hotels could change the thousands of gallons of water in their swimming pools as regularly as before.

There are other serious effects of five-star tourism, including its impact on local food and land prices, which are already the subject of numerous surveys and studies. The now defunct Goa Research Institute for Development (GRID) sponsored a one-year study by the Institute of Social Sciences (ISS), Delhi, to examine the pros and cons of tourism as an industry. The Institute of Public Opinion, New Delhi, also completed a detailed market study on similar themes for the Goa Government. Earlier there



Soak pits from shacks on Colva beach destroy its beauty

have been numerous other studies including the UN Report (reviewed elsewhere in this chapter), the report by the Tata Consultancy Services and a few other like the 15 Year Perspective Plan for Goa prepared by the Hyderabad Staff College.

Most of these studies are basically in the nature of cost-benefit exercises and seek to expand or support tourism development purely in terms of foreign exchange earned or jobs created, with precious little concern for the major negative impacts of tourism development, including prostitution, drug trafficking, moral and environmental degradation.

As with all cost-benefit exercises, the result will eventually depend on how sophisticated is the jugglery of the economist and sociologist involved.

But no amount of jugglery will shed any light on the manner in which the excesses associated with five-star tourism can be met within the framework of local Goan ecology. Such local ecology is based on renewable patterns, on the minimisation of waste and the conservation of limited resources. Five-star hotels on the other hand do not operate within such ecological restraints. Their enormous clout and political power enable them to run their enterprises by simply depriving local populations of access to those resources needed by them. All their lives, they remain exclusive oases in village environments.

It is these set of issues that threw up organizations like the JGF, CCAT, Saligao Nagrik Samiti and others.

Goan society must inform itself before it is too late about these irreconcilable sets of demands and must, accordingly, decide whether to allow their political leaders to permit these large scale obscenities or whether they wish to add to their own actual suffering in the decades to come. Such a decision needs to be taken soon before the natural environment is transformed into a mass of five-star concrete.

Tourism Master Plan — First Version

Master Plan For Tourism Development in Goa, Government of Goa (1987) pp 130

In December 1986 the Central Government decided to exploit Goa and its beaches in the interests of destination or charter tourism. It is well known that decisions from Delhi still override local and regional interests. Naturally, the Goa Government immediately asked the Town and Country Planning department to prepare a Master Plan. The Planning Department completed the preparation of the Master Plan in May 1987. A great deal of publicity was then given to the Plan and it was kept for viewing in a few public places.

Ironically these hasty moves to convert the Goan economy into a tourism economy led to spontaneous protest and the setting up of the Jagrut Goenkaranchi Fouz (JGF). The ongoing agitation later intensified with groups like Citizens Concerned About Tourism (CCAT) and others joining the fray. The JGF led its first direct attack against tourists the same year when it sent its members to the Dabolim airport to greet charter tourists with rotten fish, rotten eggs, cow dung and placards.

Eminent architects like Sarto Almeida and environmental organisations like the Goa Foundation also provided a critical reaction to the Master Plan. The result of all the cacophony was that the Master Plan was quickly shelved and very little has been heard or seen about it ever since.

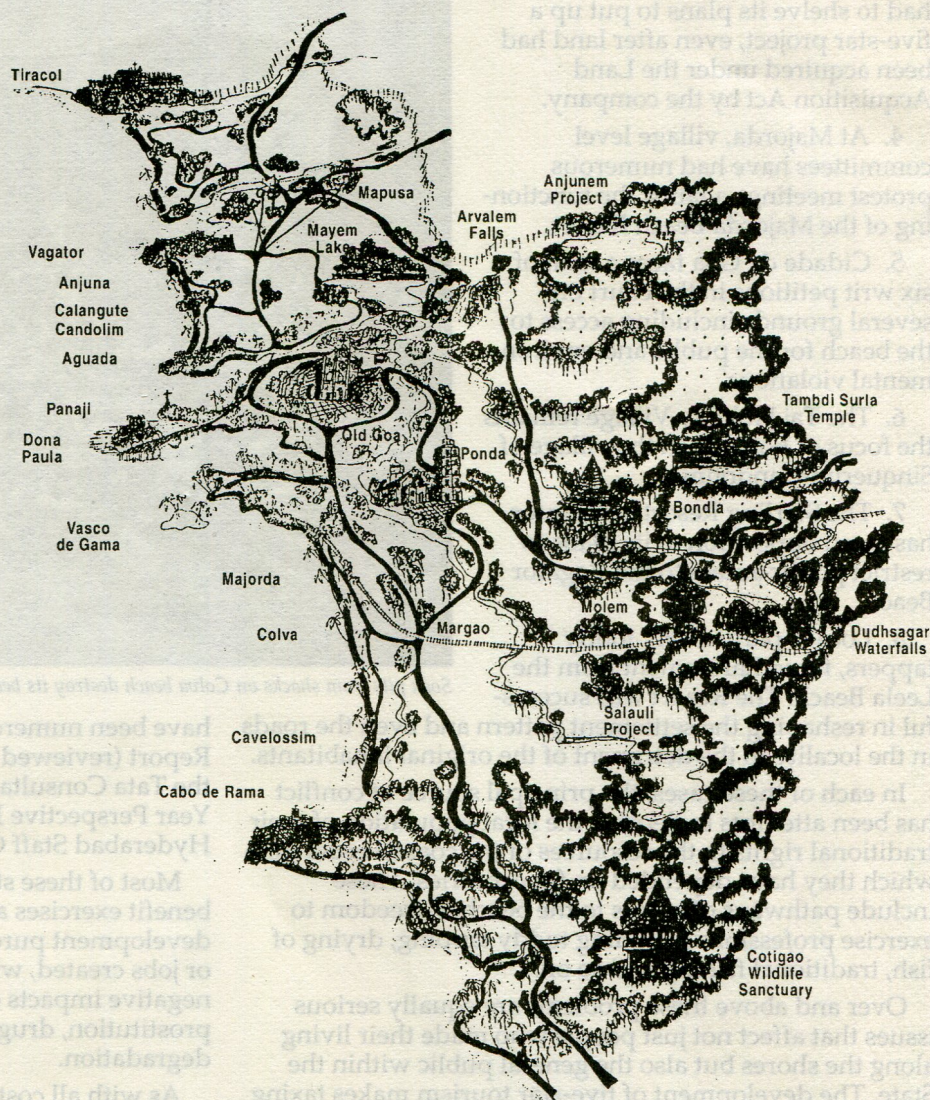
The Plan was based on a physical and socioeconomic survey of two villages, Calangute and Candolim.

The findings of the physical survey?

- i. Large-scale growth of unauthorised construction in the form of extensions to the existing houses due to the multiplicity of authorities and delays in granting sanctions.
- ii. Commercial activity spilling over the access roads due to non-availability of plots with proper access.
- iii. The plots available had a very narrow frontage and long depth, which made them unsuitable for development.
- iv. Traffic congestion due to narrow public roads and limited scope for widening.
- v. Development taking place not in consonance with the traditional architectural forms and styles.
- vi. Visual pollution in the form of hoardings etc.
- vii. Shortage of drinking water due to unprecedented increase in demand.
- viii. Erratic voltage/irregular power supply.
- ix. Garbage generation, specially by the floating tourist population and by eating houses frequented by tourist coaches.

The socioeconomic findings were as follows:

- i. Due to the haphazard growth of the physical environment, ill effects of unorganised tourism like drug trafficking, prostitution and increase in crime rate were observed.



ii. There was a conflict between traditional occupations i.e. fishing/agriculture v/s tourism trade. The high return from tourism led to this shift, creating imbalances in the village economy. Social problems were a result.

iii. High land values.

iv. The increase in the crime rate, the number of school dropouts and prostitution could be partially attributed to the inflationary trends set in by tourism.

The Master Plan proposed to expand tourism without the given effects found in the survey of the two villages. To achieve this, it sought to disperse tourism development in the rest of Goa by demarcating areas into three categories:-

1. Tourism Development Areas (TDA): where hotels with upto 100 rooms would be allowed. 13 areas for TDAs were identified.
2. Tourism Resort Areas (TRA): These would involve medium or large-scale beach resorts with over 100 rooms. These were restricted to five sites, two in the north and three in the south.
3. Village Tourism Areas (VTA): In this class, the maximum number of rooms allowed would be 10.

One of the most interesting sections of the Master Plan is that it introduced the concept of a holding capacity, which in ecological terms is called the carrying capacity of an area. Though the Plan discusses the concept, it does not make any calculations based on it. For example, if the exercise had been carried out in regard to Calangute it would have been clear that the carrying capacity of the village had already been exceeded as the findings of the physical survey indicated above amply prove.

The Master Plan did provide detailed statistics about the state of tourism in Goa. It went into considerable detail on how important residential buildings of great aesthetic value could be exploited for lodging guests. It also set out a setback line for different areas of Goa. The whole of Pernem, for example, was provided with a 200 metre no-development zone from the high tide line. Other areas were provided a 100-metre no-development zone. However, these setback lines had no statutory sanction and they also violated the policy decisions of the Government of India with regard to the conservation of beaches.

GOAN NGOS ON THE PROPOSAL FOR A NEW TOURISM MASTER PLAN

In India, 'tourism' as a human activity, has been going on from time immemorial. The 'tourist', the stranger, the traveller, the pilgrim was associated with high moral significance and given the term 'atithi'. The 'atithi' was to be respected highly as 'atithi devobhava'.

We do not believe, therefore, that there is anything wrong in accepting tourism as a normal and important human activity within the Indian economy. Through travel and visiting non-familiar places, the individual sought adventure, knowledge, divine blessings, experience, pleasure and sometimes even wealth.

In course of this activity the community at large also benefitted in a significant way.

Today tourists visit Goa for one or other of the above reasons, but largely to enjoy the natural surroundings maintained by the local population, within a relatively safe and secure environment and due to a perception that there are local infrastructural arrangements.

Despite the obvious assets of well nurtured nature—created neither by the Tourism lobby, the Tourism Department or other tourism promoters—and hospitable people, the lack of a firm tourism policy has led to a remarkable decline in tourism quality and potential, eroded the sustainability of the tourist economy and—most important—undermined the hitherto existing high quality of life available to the local citizens prior to the promotion of tourism.

There is also official acknowledgement that much of the tourism assets available in the form of the state's natural ecological endowments have already been squandered, frittered away and sacrificed for the wrong category of tourist (charters), whose presence has brought neither money nor pleasure to the local economy.

To discuss these issues, some of the Goan NGOs met at a special meeting in February 1997 to discuss the Tourism Department's proposal to formulate a Tourism Master Plan for the state. This meeting was initiated by the Goa Foundation and other NGOs in response to a written invitation from the Department for suggestions and recommendations regarding the proposed Tourism Master Plan.

An earlier Tourism Master Plan prepared by the Government in 1987 created so much controversy when it was printed and published, that it had to be withdrawn. In the circumstances, it appears that this time around, the Tourism Department would like it to go on record that it has gone about the exercise in a more consultative way, inviting suggestions from the public and from NGOs

prior to preparation of the proposed Tourism Master Plan.

The specific preliminary issue the NGOs discussed was whether the exercise of preparing a Tourism Master Plan was not already too late since the broad trends of tourism arrivals in Goa and also categories of tourists seem to have already crystallized in an irreversible way.

It has become apparent to all, particularly the Government of Goa and the Department of Tourism that the tourism economy in Goa is already in a glorious mess.

A large number of domestic tourists come to Goa simply because liquor is cheap and abundant. Some of them come because they have heard about Goa as an area where there is free-style living, as in America, with nude hippies moving around the beaches available for exhibition, prostitutes are available freely, locals are perceived to have lax moral standards, and drugs are not difficult to access.

Criminals from all over the world and the country also come here because they can remain easily unidentified in the cosmopolitan tourist crowd. This has become a fertile ground for underworld activity, particularly the drug

School children cleaning up the mess left by food festivals on Miramar beach



trade which promotes beach and acid parties at which large numbers of foreigners converge.

In practice, in reality, only one thing about the tourist economy has worked: the tourists have come. However, even this is a failure of sorts because—according to the Tourism Minister himself—we are getting the wrong type of foreign tourists. We are getting the charter tourists who come here on a shoe string budget. Unfortunately more resources are used to cater to these foreign tourists even though they account for only 20% of tourist arrivals. The situation has become so ludicrous that there are about 50 swimming pools between Baga and Sinquerim. The really sick part of this tourism-related fiasco is that these swimming pools are within about 300 metres of the Arabian Sea. The local people and domestic tourists may

go thirsty and without a bath but the Government of Goa is least bothered.

The bankruptcy of the planning process becomes abundantly clear if one studies closely the July 1987 Master Plan For Tourism Development in Goa.

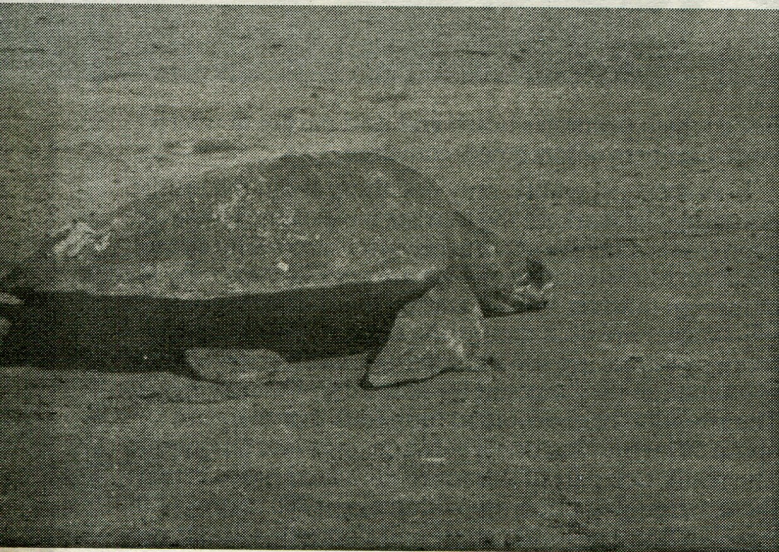
The Master Plan is full of all kinds of projections, extrapolations and recommendations for dealing with the growing influx of tourists. There are tables, graphs, bar charts, photographs, diagrams for all kinds of tourism-related parameters. The number of tourists likely to come in a particular year, the requirements of electricity and water, the demand for food and transportation, the need for accommodation and entertainment, the plans for beautification and even the preservation of the Goan environment, all these issues are covered. This is the theoretical exercise.

While the 1987 Master Plan for Tourism had projected tourist arrivals in the year 2001 at 11,20,000, the tourist arrivals for 1996 were already 11,50,000! So we have exceeded the arrivals planned for the period 5 years hence already by approximately 30,000!!! It is no wonder that all our facilities are under so much strain. The state just cannot cope with the demand for power, water, transport, food and accommodation. Naturally, the brunt of this tourism burden is being borne by the local population in whose name and for whose development this exercise is allegedly being promoted.

The coastal area of North Goa is supplied water from the Assnora River. Two years ago the river ran dry because of the water being pumped to the tourist belt. Now the Government has installed 2 x 700 hp pumps to pump water from the Amthane river in the hinterland into the Assnora river. Thus, even water that was earlier marked for irrigation is slowly being diverted to the coastal belt to feed the tourism industry. At the same time, large areas of agricultural land are being converted for industrial and commercial purposes.

There is big talk about environment protection in the 1987 Tourism Master Plan. In reality, sand dunes are bulldozed away or built upon. Fruit-bearing trees are cut by the thousands to make way for concrete jungles. Millions of litres of water are then wasted in trying to maintain lawns. The tourism department, the Town and

The Olive Ridley turtle also has rights to visiting Goa's beaches



Country Planning department and the law department are working in collusion with the builders and hoteliers to sabotage the Coastal Zone Management Plan at every possible opportunity.

Power supply over the last 10 years has become a sick joke for the local people. The Government has no control over voltage or frequencies. To make matters worse, the hotels are provided with transformers on their doorstep. This further lowers the voltage for the other consumers in the circuit. Power consumption has far exceeded the availability, due to increased demands by the unplanned for tourist arrivals. But the electricity department's projections in the 1987 Master Plan show that the power availability in 1990 exceeds the power requirements for the year 2001.

The 1987 Master Plan merely states that transportation is going to be a problem area. The figures for road transport (*see below*) are indicative of the pressures resulting from unsound traffic planning.

Taxis and tourist buses may have multiplied over the years but local public transport has been totally neglected. The problems of the local people do not end there. Since we are getting low-budget tourists, even they travel by the local buses to save money. Most of these foreign tourists are twice the size of the local people which further inconveniences the locals.

The registration of vehicles shows the distorted increase, in various categories, between 1992 and 1996 as follows:

Two wheelers	50% increase
Cars/Jeeps (private)	55%
Goods transporters	42%
Taxis	99%
Buses/mini buses	10.5%
Three wheelers	50%

These figures clearly show that public transport has been totally neglected and has forced people to opt for private transport.

This situation has been further compounded by the huge influx of migrant labour for the builders and contractors. Nobody in the Government seems to have thought about health or sanitation. There is no attempt to provide deep sewerage or effluent treatment plants even for the settled population. No permanent or satisfactory provisions are made for garbage disposal. Garbage disposal means clandestine dumping on some vacant land or in some abandoned quarry.

Even the septic tanks are under-designed and cannot take the effluent load during the tourist season. The hotels simply let the effluents overflow into the storm drains (*sangrias*) resulting in large numbers of water borne diseases and pollution of underground water.

The state of the beaches is deplorable. Miramar beach is being used as a public toilet right upto the Collectorate. The first impression of tourists arriving by the catamaran when it was in operation a few years ago was the sight of squatters doing their business early in the morning.

The increase in the fly and mosquito population - affecting tourism prospects further—in the coastal area is proof of the above. Victims of vector-borne diseases have increased exponentially even though the Government

Health Centres have worked assiduously to doctor their books and fudge the statistics so the situation does not appear too grim.

Food prices have gone through the ceiling because not enough is grown in Goa. Goa being a high wage area, it is not conducive to food production. Hence the high cost of food, which has to be transported from Maharashtra and Karnataka. This is noticeable at any of the check posts where most of the incoming trucks are loaded with food items.

When it comes to accommodation, the Town and Country Planning department, Tourism Department and the builders' lobby have together perverted the plans of proper rational tourism development by permitting rent-back schemes. Instead of encouraging local people to accommodate tourists, we now have large numbers of ugly apartments being built for absentee landlords and then used for housing charter tourists. In fact, any enterprising local who tries to accommodate tourists will get harassed by about half-a-dozen Government agencies.

As for entertainment for tourists, we have the usual story. It has degenerated into prostitution, pimping, drug addiction, alcoholism, gambling, child abuse and all kinds of 10-cent peep shows. Those not dependent on tourism and who are in other professions and trades are at the receiving end of a phenomenal amount of noise pollution, with loud music blaring until the wee hours of the morning.

The general conclusion arrived at is that the tourism development of the past ten years has resulted in undermining the quality of life and the environment of the local people—polluted water, surroundings—and made life more difficult in economic terms. Thus, tourism is underdeveloping Goa, instead of developing it and increasing welfare. This is due to the absence of any noticeable tourism policy on the part of the government or the Tourism Department. In the circumstances, it is proper to ask what sort of tourism policy the state should have today. (Implementation of such a tourism policy is another matter! Even elementary laws cannot be enforced in Goa due to political interference at all levels of the administration.)

It cannot be argued in the circumstances that the welfare of Goa and its citizens will be met with the continued promotion of Goa in world circles and by welcoming larger numbers of tourists. The time indeed has come to revolt against the official perception of politicians, bureaucrats and tourism trade that the needs of tourists should take priority over the needs of the local people.

We should be happy to offer to the world the good things we have and which they would also like to enjoy. However, this cannot be done at the cost of depriving ourselves and our posterity of our ecological assets and our quality of life. Indiscriminate development (acquisition) by government is depriving us of our ecological assets, properties and quality of life. Today the economic benefits from tourism are emphasized and the social, moral, cultural and environmental values are ignored. Even the economic benefits are calculated in a very narrow way—as benefits to those who are directly involved in them and not the community at large.

We are not ready to accept such a tourist economy or policy. We reject such tourism in toto. It should be well understood that tourism is for Goa and Goa is not for tourism.

Recommendations — The Master Plan for Tourism in Goa should focus all its primary attention and resources on:

a. Improving drastically the quality of services in tourism designated or tourist-popular areas in terms of water, electricity, telephone and such allied services including sewage and garbage removal; emphasis should be on improving services to the local people first and then for tourists. This should be done in cooperation with the other departments, including Public Health, PWD, Forest etc.

b. More emphasis should be placed on providing facilities for domestic tourists. Domestic tourists put less pressure on resources in general. Too much investment has gone into making provision for foreign or charter tourists. One cannot develop a healthy tourist economy by encouraging slavish and colonial mentality with regard to white tourists. Foreign tourism, especially the charter variety, can also be fickle and unpredictable. One plague scare or a Babri Masjid scenario will make them overnight cancel tourism plans and stay away. Charters do not bring in proportionate benefits.

c. More stress should also be placed on safeguarding natural resources and man-made heritage areas. Protection of historical places and heritage sites is a must. Heritage zones particularly to be protected are the temple zones in Ponda and the Old Goa complex.

d. Minimum wages should be not less than Rs 2500 per month for the tourism trade. Working conditions must be just. The hotel industry is notorious for job insecurity, symbolised by the system of giving employees a 'break' from service four months every year.

e. The Tourism Trade Act must be strictly enforced. It is not being done at present except in a cursory way. For example, hotel tariffs must be prominently displayed to avoid extortion of tourists, especially during peak periods. Lack of enforcement is giving Goan tourism a bad name. Taxis should use meters rather than charge what the market will bear. Arbitrary rates should be abolished.

f. There should be no further expansion of tourism. Places like Bhutan have already imposed a ceiling on the number of tourists that can visit every year—this is the only way to protect our ecological and tourism assets for a sustainable industry. Put a lid on any increase in tourist—charter, foreign or domestic—influx until the infrastructure can meet the standards of normal human beings living in a civilised society. This is a firm demand of all groups and of the population at large. Until and unless the infrastructure and services for the local people improves, we demand no further increase in tourists. Tourism promotion at London and Berlin and other places should be suspended. If this is not accepted, we intend to make this problem an issue with tourism promoters worldwide.

g. The budgetary allocation for tourism infrastructure, income from tourism and expenditures by the state to promote tourism needs proper study in public interest. We need to have authentic information on forex earnings

and outgoings. The hotel trade may bring in forex. However, it is also responsible for large scale forex spending.

h. The administration must improve water supply, electricity quality, sewage and garbage facilities, transport, health centres and other basic facilities before it can be permitted to bring in more tourists. This is a nonnegotiable issue. Consumption of water and electricity by hotels should not become a financial burden to the common man. Beaches should be cleaned through taxes collected from tourists and hotels. The population is fed-up with what tourism has done and is doing not just to the environment but to the overall quality of life.

i. In addition, we feel the following corrections in policies are also required:

a. Tourism promotion should not distort the image of Goa, the Goans or women. This has been a habit with both the Goa Government and the Central Government. Any further carelessness in this regard is bound to be costly for tourism.

b. The indiscriminate proliferation of bars and liquor shops has become a curse to Goa. A ban must be imposed on granting any further licenses for production and sale of alcohol. Bars should follow rules (i.e. timings) strictly. No drinking should be permitted on streets, buses and market places. There must also be a well worked out plan to bring down alcohol related economy step by step. No useful purpose is served by keeping the population drunk all the time. Prohibition has become a technological necessity.

c. No permission should be granted to casinos on land or sea and no gambling activity in any form ought to be permitted.

d. There should be a code of dress and behaviour for tourists so that these do not conflict or disrespect local culture and opinions. There is a saying in Konkani: *Gharasarko pauno—paunyasarko gharni* (the guest should adapt to the house, not the house to the guest). The tourist should follow the norms of the land. In fact, he is willing to follow the norms of the land. In Malta, tourists even carry their unprocessable garbage back with them to Germany. If we do not respect ourselves and our own

environment, there is no need to expect that the tourist will do so.

e. The Tourism Department and tourism promoters and the hotel trade generally ought to recognize that their activities cannot be at the expense of other sectors of society in Goa. As we have stated earlier, loud music parties disturb the peace of entire wards. Perhaps the tourist trade assumes that children do not go to school or have to study in rural areas, and that other professions and trades are unimportant so they can be roundly disturbed. This atrocious disregard for the non-tourist oriented population is bound to increase hostility of the general population and create problems which may be difficult to reverse.

We are of the strong view that any Master Plan for Tourism promotion for the next decade in Goa must take note of the above recommendations, if it wishes to promote sustainable tourism and tourism that benefits the local community instead of degrading it.

We recommend that the Master Plan for Tourism should be placed before the public after it is drafted, for comments from the general public and for achieving a consensus on the issues raised. The undersigned organisations are ever willing to hold parleys with the tourism authorities on these important aspects of tourism policy.

Tourism in Goa today is at a critical crossroad. If corrective features are not immediately introduced, its future will be damned for all time to come. Goa will be reduced—if parts of it are not already—to the status of a concrete slum. In such a scenario, it is fruitless to expect that tourists will leave their own slums, whether in Mumbai or Germany, to visit the state.

On the other and corrective measures installed within a predetermined time frame will improve not just the prospects for tourism on a sustainable basis, but lead to a remarkable improvement in the quality of life of the people in the state.

The Goa Foundation, Nirmal Vishwa, Goa Fisherman's Union, Peaceful Society, Bailancho Saad, People for Animals, Bailancho Ekvott, INSAF, Indian Heritage Society
(Dated: 16.3.1997)

Book Review

See The Evil: Tourism Related Paedophilia in Goa by Nishtha Desai, Vikas Adhyayan Kendra, Mumbai, 2001.

Pp.79, Rs 40.

The Freddy Peats case in 1991 for the first time brought the issue of tourism-related paedophilia into the mainstream consciousness. Prior to this, many Goans lived in blissful ignorance of this scourge. Tragically, even after the Freddy Peats case (and a host of other cases which have followed), many Goans continue to take an ostrich-like attitude to the problem. This allows the practice to continue unchecked, and even grow.

Nishtha Desai's powerful argument squarely places the responsibility upon each one of us—'Paedophilia exists because we allow it to exist.'

Far from being an armchair study of a 'social problem', the book is written from a perspective of committed activism, which only increases its impact. By documenting the cases of paedophilia, it does not permit us to hide any longer behind the curtain of ignorance. One also comes to share the frustration of the author—despite much information, the police and the authorities have failed to act. The cases of Helmut Brinkman and Colin Middleton are examples—the former was allowed to escape the country despite having been convicted of child abuse (the sentence was overturned on a technicality), and the latter

is out on bail. Countless other cases languish for want of evidence. Frighteningly, one of the offenders, Ernie Jean Francoise, continues to visit Goa with impunity!

Paedophilia is one of those slippery problems that is very difficult to tackle. The nature of the crime is such that its victim often becomes a part of the conspiracy of silence which surrounds it; getting evidence together becomes almost impossible. Very often the offender is tipped off, and succeeds in obliterating all evidence implicating him or her.

The book underlines the need for all sections of society to work together on the issue, and force the government to shed its position of denial and act to end the menace.

Reincarnation of the Master Plan

The first Tourism Master Plan which was prepared in 1987 by Goa's Town and Country Planning Department was grounded after it failed to get public support. A decade later, the Government of India's Ministry of Tourism recommended that Goa's Tourism Department should once again prepare a Tourism Master Plan for the State with a 25 year projection.

Instead of asking knowledgeable Goan experts to prepare the Plan, the job work was tendered to Consultation Engineering Services (CES) Ltd. in Delhi. Thus, once again, despite all the constitutional directions and provisions regarding decentralised development, the planning of a critical activity like tourism was handed over to a New Delhi group thousands of kilometres away. (Incidentally, the same Company was also given the job of preparing the Regional Plan for Goa 2011 A.D.)

CES was directed to prepare the Master Plan in three stages. Accordingly, it prepared a Basic Information Report in June 1999 and an Interim Report in August 1999 and the Draft Final Report a few months thereafter.

Despite the fact that the 1987 Master Plan was rejected due to opposition from the public, no effort was made by CES to involve the public in its work. The only groups it held discussions with were the Travel & Tourism Association and the Goa Chamber of Commerce & Industry. Despite the fact that the NGOs had prepared a detailed submission on the proposed Master Plan and handed it to the Tourism Department, the CES blindly carried out its work in the usual vacuum. On the contrary, it even made a few rude remarks about the opposition to tourism as a negative feature of the Goan scene.

There are only two aspects of the CES Master Plan for tourism in Goa which need to be highlighted. The first is the Carrying Capacity analysis and the second refers to its proposals to divert tourism activity to non-beach areas. Neither of these two components, or any of the other recommendations for that matter, would justify the amount of money spent on the preparation of the Plan. In many ways, the study reports disclose far less competence than what was exhibited by the Goa Town & Country Planning Department when it prepared the First Master Plan in 1987.

Carrying Capacity Analysis — For its carrying capacity analysis, the CES report relies on a 1989 survey carried out by two consultants, P.A. Apostolides from Greece and Ramesh Chandra, the then Additional Director General of Tourism, Delhi. Their study for the State Government recommended a Carrying Capacity of 40 sq m per tourist. No reasons are given for the figure. The 1989 report assumed an annual growth rate of 5% and projected tourist arrivals of 2.5 million by 2000 A.D. The report also recommended that not more than 46,000 bed capacity be allowed in the

coastal area. The study did not look into diversion of tourism to any other areas of the State.

The 1999 Master Plan assumes the 46,000 bed figure as sacred. The report states:

'Based on the considerations of seasonality of tourist arrivals and the fact that domestic tourists do not make as extensive use of beaches as do foreign tourists, and spend much of their time shopping and visiting places, an average capacity of 40 sq m of beach area per tourist bed would be an appropriate standard in assessing beach carrying capacity. Assuming an average width of sandy beach of 40 mts. application of this density standard means that not more than one tourist bed per 1 m of beach frontage should be developed.'

'The standard of 1 metre of beach frontage per tourist bed is applied to the 46 km. of available beach and results in an overall regional maximum development level of 46,000 tourist beds. (The 1989 study stated that not more than 75% of the beach or 46 kms out of 65 kms of total beach length should be diverted.)'

The new Master Plan recommends diversion of tourism from beach areas to the hinterland and works out a total bed capacity of 38,782 in 2006, expanding to 62,776 beds by the year 2021. How these projections are arrived at is remarkable. A simple growth rate is assumed in linear regression without consideration of past experience. For example, the total number of beds in 1994-95 was 17,500. Two years later, it had gone up marginally to 18,391. This 'bed-based' approach to tourism development could only emanate from people who have gone through some very strange education. Consider the large numbers of tourists who visit Goa in Sumos and buses but do not use beds. The entire Master Plan seems exclusively is designed to project the need for more and more beds.

It is amazing that a discussion of the environmental demands associated with each of these beds is fairly nonexistent in the Master Plan. Neither is there any discussion worth the name on the large-scale destruction of natural assets that would be required in order to accommodate the buildings within which these beds would have to be located. Neither is there any consideration of the havoc that has already been caused to the socioeconomic environment due to the existing 18,000 beds.

The second component of the Master Plan is more disturbing. It recommends wholesale diversion of tourists to the ecologically sensitive areas of the Western Ghats where it recommends even activities like para-gliding, bungee jumping and organised wildlife tours in vehicular coaches to reserve forests.

The two reserved forests recommended are Bordla (*sic*) and the Salim Ali Bird Sanctuary. Bordla is actually a zoo and the Salim Ali Bird Sanctuary is a mangrove forest. How both can

accommodate vehicular coaches is beyond understanding. The report also recommends opening up Great Island (actually Grande Island) for an amusement park and water sports despite recommendations of the Forest Department and the NIO that the group of islands should be converted into a protected marine park. Ecotourism development, the Master Plan says, should focus on Goa's Western Ghat hill sites, wild life, waterfalls, lakes and riverine system. There is no discussion whatsoever of how the environmental devastation that has accompanied coastal tourism could be prevented if tourism is allowed to invade these areas as well.

In future, the Goan public should monitor such groups assigned to do work on Goa by the State Government. No one is more intelligent than the Goans on what is best for Goa. They understand their bioregion extremely well. They are highly educated. They can easily prepare more credible reports. We should be spared the Delhi advice from persons who have neither interest nor inclination to understand our real problems and proffer adequate and realistic solutions. The Tourism Master Plan prepared by CES is a disgrace and a crime because a lot of good forest produce went to make the paper on which it was finally printed. Goa has not benefitted in any manner. Maybe the politicians who assigned the tender to CES benefitted, as they always do in such matters. But no one should forgive them for rushing to Delhi to prepare plans for Goa either for tourism or for general development. The sooner this is known, the better for all concerned.



TOURISM AND THE COASTAL ZONE

Human pressures on the coastal ecosystems of Goa started during the 1970s when tourism became a source of revenue. This resulted in 80% of the urban growth being located along the coastal talukas. Since then, there has been a proliferation of hotels, resorts, residential flats, dwellings, small restaurants, beachside bars, roads and beach shacks along the coast. This is because most tourism and associated activities are concentrated along sandy stretches. Over 90% of domestic tourists and 99% of international tourists visit and reside along the beach front.

Although upmarket tourism and related activities have brought in a number of positive benefits in the form of employment-related opportunities, coastal developmental activities have induced notable environmental and social problems. Surveys indicate that several coastal areas are overcrowded due to a haphazard growth of structures, resulting in undesirable overurbanization of coastal regions, loss of biodiversity, deterioration in the quality of life and adverse effects on beaches and dunes, mangroves, water bodies and *khazan* lands.

The major reasons for these problems can be summarized as follows:

Hostility towards CRZ: One finds a growing antagonism to the most vital instrument devised to protect the coastal wealth of the country. Although in force since 1991, the notification is not being implemented seriously.

Sectoral practices: There is a fragmentation of jurisdiction because several agencies work at cross-purposes due to reluctance to cooperate and coordinate. As a result, conflicting economic and management interests are observed.

Irregular management policies: Diverse ecosystems often need sound site-specific management skills. On the contrary, we find a lack of cooperative planning.

Ignorance about the strategic value of the coastal zone: Due to lack of awareness and ignorance about the intrinsic value of coastal ecosystems, policy and planning deci-

sions are based on short-term economic gains. Long-term value of resources is rarely considered.

Migration of human population towards coasts: Unchecked movement of people towards sandy areas has caused anthropogenic stress on coastal systems, degradation of coastal environment and unrestrained growth of coastal strips.

Unbalanced growth of tourism: Beach tourism is the major activity that is being promoted. This has led to a concentration of resorts and undesirable pressures on coastal strips.

Lack of political will: Powerful lobbies of builders and resort owners, who have invested heavily in coastal areas, are mainly responsible for construction of illegal structures and for flouting environmental guidelines.

Lack of integrated information base: Information about various ecosystems and processes and inventories of coastal resources and habitats are hard to find. More importantly, we find a missing link between results of scientific research and coastal area planning.

Consequences of inaction — Inaction by the authorities has led to the following consequences as exemplified in north Goa:

a. Several coastal villages, once separated by open spaces, are merging into one long continuous strip of hotels and resorts.

b. Existing fishing settlements are struggling for survival as developers have bought most of the coastal strips.

c. This strip of the coast has the maximum number of hotels, guest houses, restaurants, tourism shops and beach shacks.

d. There is no proper access to beaches due to a thick spread of structures.

e. Authorities are keen in promoting international tourism as a prime policy whereas upmarket tourism is unplanned and out of tune with the present structure.

f. Local authorities appear powerless to implement and enforce appropriate plans and policies.

Such unplanned developmental activity makes Baga-Sinquerim the most severely degraded strip of the Goan coast. Thus, the CRZ of Goa is at stake.

For these reasons, courts have intervened in coastal matters following complaints and petitions from citizens and NGOs. Many constructions have been stopped while some have been demolished. Similarly, courts have ordered hotels and the State Government not to allow constructions within 200 m from HTL. Courts have also ruled that disturbing sand dunes threatens coastal ecology and hence sand mining leases had to be cancelled. Stay orders have been imposed in several cases. Hence, timely judicial intervention has, to some extent at least, preserved the sanctity of the coastal zones.

Antonio Mascarenhas

Unscrupulous builders dump building debris on Gaspar Dias beach



ALTERNATIVES

Environment-Friendly Tourism — Goa has been for many years the capital of a phenomenon in Indian tourism called 'Hippie Tourism'.

A feature which strikes the eye immediately here is the abundance of foreign tourists, dressed in ragged clothing with just a rucksack and a sleeping bag on their shoulders. All the beaches and coastal areas have large numbers of such tourists lying around, soaking in the sun.

In Goa, all foreign tourists are called 'hippies'. The description dates back to the late 60s and the early 70s when hippies from the West first began to visit Goa regularly. But now, except for a few diehards from those old days, very few hippies come to Goa (probably because there are very few hippies left in the West itself and the 'flower people' seem to have given way to Rambo).

Their absence has, however, been compensated for by other groups like foreign students on a tight holiday budget, various misfits from the west who, unable to withstand the pressures of life there, come to Goa to 'find themselves', and those with a taste for narcotics, who find it cheaper and less dangerous to indulge themselves in the relative freedom available here compared to the 'democracies' of the West.

Of course, the five-star western tourists and the charter tourists who get the five-star facilities by paying three star rates, are another breed altogether (economically, if nothing else)—both groups are mutually exclusive and keep away from each other.

There are a surprisingly large number of working class people among these 'hippies'. Exchange rates being what they are, one day of work in the industrialised west translates into one week of leisure here. Consequently, there are a number of westerners who work for nine months a year and save enough during this period to finance a three month holiday in Goa. Nowadays, one also sees a number of students who, before getting into the routine of work, want to experience life.

If the preceding section sounds a little unkind, let it be said immediately that this kind of tourism is infinitely preferable to five-star tourism culture. It does not place any particular strain on the local resources—these 'hippies' live more or less like the local people, eat like them, behave with far more decency than one sees among the richer tourists, and are fairly well accepted by the local people.

The Bible of this section of tourists—the Lonely Planet guide—gives a good indication of the approach of this class to tourism. The idea is essentially low-budget, leisurely travel rather than the high-price consumption tourism being promoted by ITDC and other government bodies. Since it does not bring in major dollars, the Goa Government hates it. So do the five-star resort owners.

From Arambol in north Goa to Palolem in the south, many Goan families let out a section of their houses during the tourist season. Others have built cottages in their backyards, which they let out room-wise. Rents here vary from Rs 300 to 600 during the peak tourist season, depending on the availability of additional facilities like

running water, a bath, a WC, and ceiling fan. There are a number of small restaurants and bars along the shore front which are frequented essentially by these tourists. Motorcycle 'Pilots' do brisk business. What is most notable about all this is that there has not been any change in the customary life-style of the local people. Tourism has adapted to local culture, and not the other way around.

There are, however, a number of unhealthy spin-offs. Chief among these is that a considerable section of the local population has ended up becoming economically dependent upon tourism. With rising unemployment, the income derived from letting out a section of their houses is the only means of livelihood for many families. In many cases, people have tended to neglect their traditional occupations, like agriculture, because all their time and energy is devoted to making a living out of tourism. When the tourism boom collapses, a number of people are bound to be rendered destitute.

Another problem is the effect on local culture. Even if we disregard the puritanical, reaction of the Goan middle classes, there is no gainsaying the fact that various problems have arisen as a result of the interaction of two completely diverse cultures. A large section of Goan youth has blindly accepted the more hedonistic life-styles of these tourists, without being able to locate the cultural milieu within which such a life-style has emerged.

Furthermore, the west has exported many of its problem human cases to Goa.

For the tourists, Goa is a holiday lasting a few weeks or months. They indulge their hedonistic streaks to the hilt, something they cannot do at home, and drug taking is a common phenomenon—about 90 per cent of the foreigners here take drugs fairly regularly. With the easy availability of physiologically addictive drugs like adulterated heroin (smack), problems arise. A number of local people have become involved as peddlers and an even larger number have become themselves addicted to such drugs.

Given the inequalities between the First and Third Worlds, it is unrealistic to expect a healthy relationship between individuals from these two groups. There are a number of depressing sights: young girls getting sexually involved with foreigners purely for much needed economic benefits; or a tourist hogging the meagre water supply during the month of May. But there seems to be very little racism or exploitation or master-slave relationships. Nowadays, a lot of upper middle-class Indian youth have also become part of the hippie tourist scene.

With all its drawbacks, this kind of tourism still presents a healthy alternative to the five-star tourist culture. It is kinder to the environment and the local people involved. There is a genuine attempt to respect the cultural sentiments of the people—nudism is not practised on the more public parts of the beaches (this is probably as much out of fear as of respect). If only some of the more undesirable aspects could be weeded out, we might have the seeds of an alternative tourism right here.

Bhakti Kutir: An Environmental Retreat

'It's straight out of pages of Bill Mollison's *Permaculture*'—my first thought when I first encountered Bhakti Kutir, perched just above the southern end of Palolem beach.

A profusion of green growth, and of the brown that results from it—thatch and straw, coconut husk and harvested bamboo. The thatch used to fashion roofs, the bamboo for screens and for comfortable, generous furniture; straw littered on the ground to aid the regeneration of topsoil—a scarce commodity in coastal Goa; coconut husk lit twice a day to provide hot bathing water.

So what is Bhakti Kutir? In a world where tourism is usually synonymous with environmental degradation, Bhakti Kutir is that rare oxymoron—a genuinely green tourist resort. Not the cosmetic green of water-thirsty lawns and manicured shrubs, but the deeper green of nature aided back into the virtuous cycle of interdependent growth and mutual support among the species.

There are 18 guest cottages at Bhakti Kutir, and though they have all been built over the last 5 years, they blend so perfectly into the environment that they have the timeless quality of an Indian village. Filtering through the palm fronds and the smoke of morning fires, the light plays with the resort all day, casting patterns of thatch on mud floors, or creating warm pools for dogs to laze in.

That is, when the dogs aren't chasing the kittens, who feed off kitchen scraps; or scattering a brood of chickens, who are the perfect vacuum cleaning system for the outdoor dining facilities. Of course, the bulk of the kitchen refuse goes into compost pits, along with leafy matter. At another site, Panta Ferrao, co-owner, prepares organic manure from fish offal and the waste of a mushroom growing 'factory'.

This manure, and hundreds of tonnes of transported soil, helped kick-start the regeneration at Bhakti Kutir, which, just five years ago was your typical coastal coconut grove, with no topsoil, no undercover, and no other tree-species in sight. Today, creepers snake up healthy tree trunks, and orchids blossom in the monsoons. Young papaya trees are sprouting their first fruit, and mango trees bloom in the winter.

And in the typical Bhakti Kutir bathroom, you can choose to hang your clothes either on a clothesline, or on the young tree that grows within it. One uses the term 'room' rather loosely here—the facilities are located within a circular matting screen open to the sky, and the floor is grey stone, with interstices charmingly filled with sea-shells. Bath water comes out of drums refilled twice a day, and the sanitary facilities are of the simplest 'pour-flush' design that returns organic material to the earth in the shortest cycle possible, and uses the least amount of water in so doing—two litres per use, as compared to 12 litres for the average 'flush'.



Cottages constructed of hundred per cent biodegradable material at Bhakti Kutir

Water conservation is a major issue at Bhakti Kutir, since the efforts to dig a well yielded nothing—something of an irony, since Panta had helped several other tourism entrepreneurs locate and construct wells in north Goa. Drinking water, too, does not follow the easy cash-and-carry (and create litter) option presented by mineral water bottles. Though mineral water is sold at Bhakti Kutir, most residents opt for clay 'goojas' filled with water processed through a high-tech water filter imported from Germany.

Laid back as the ambience of Bhakti Kutir may seem, a facility like this is not possible without deep thought and a careful consideration of, and experimentation with, options. Panta and his German-born wife Ute, have had a great deal of tourism experience—Ute helped to manage a similar facility in Cancun, Mexico for several years. Then, as tourism boomed, and real estate prices soared, 'The owner found the returns from our operations less and less attractive, and finally sold out to a developer. I decided that I wanted to create a resort of my own, one where the money value somebody else put on it would not cause it to be destroyed.'

At Bhakti Kutir, Ute and Panta seem to have been able to create a more beneficial cycle between money and nature—attracted by the softness of nature at Bhakti Kutir, the tourists bring in the money. The money pays for local services and local produce—tender coconuts from directly overhead, brown rice grown at an organic farm nearby, and the local fruit of the season. Tribals from inland areas regularly bring in herbs and millets, fisher folk bring in the catch of the day, and even the wandering tribes of urban crafts people find an outlet in Bhakti Kutir—where unusual paper lamp shades, terracotta planters and ashtrays add to the eclectic atmosphere of the space.

And the surplus goes back into restoring nature, into reclaiming more land for restoration, building bunds, bringing in manure, creating more topsoil, planting more trees. And, hopefully, demonstrating to many that human enterprise in the same direction can be either damaging or healing. The way to make a difference is caring.

Mohit Satyanand



ECOTOURISM IN GOA: HYPE AND MYTH

As environmental consciousness has grown in the past two decades, one of the responses of industry has been to repackage its activities as being 'eco-friendly'. In the tourism sector, this has meant the creation of a whole new concept called ecotourism. Two clear strands within this process in Goa can be identified. First, the tourism industry, reeling under the criticism of its environmentally destructive activities, has responded by recategorising many of its activities as ecotourism. This has been relatively easy in Goa, as the greater portion of tourism in Goa is centred around environmental features like the sea and rivers. Second, the government and the tourism industry have used this phrase to justify the opening up of new areas to the onslaught of tourism.

Ecotourism is the largest growing sector with an estimated annual growth rate of 10-15%. Amongst all international visitors (528 million), nature tourists comprise 40-60% (211-317 million). Realizing that ecotourism can be a powerful instrument/strategy for the preservation of nature, year 2002 is designated as the International Year of Ecotourism by the United Nations.

Though activities offered under ecotourism are very diverse and there are different interpretations, which are area specific, very broadly it can be defined as: 'Environmentally responsible travel and visitation to natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features—both past and present) that promote conservation, have a low visitor impact, and provide for beneficially active socioeconomic involvement of local populations.' That's as far as the textbook definition goes. In Goa, the only operative parts of the definition as far as the tourism industry is concerned are: 'Travel and visitation to natural areas'; the rest has been given the go-by.

Goa is endowed with breathtaking landscape features from the ever-green Western Ghats ranges to alluring beaches and is the appropriate place for promotion of ecotourism. For the last few years, a trend to attract tourists by marketing the ecological aspects of the activities has grown phenomenally. The five-star hotels so far targeted by the environmentalists for their encroachment on the local economy, environment & culture, have been quick to market themselves with green label. Even the small establishments and hotels along the coastline from Calangute to Colva are trying to ride the wave.

At the comparatively isolated pocket of Palolem and Cabo-de-Rama, in every season the beach is full of coco huts, tree houses and tented structures. Every year many new establishments join this trend. Though this shift to

so-called ecotourism is welcome, it is very saddening to note that it is a very shallow change. The potential of ecotourism to enrich our understanding & documentation of our cultural customs, and ceremonies remains unexplored. The pleasure of rediscovering spectacular flora and fauna, and understanding their values with an opportunity to contribute to their protection is lacking in our tourism management & promotion programs.

The superficial change, though very well marketed by the Taj and other five-star hotels of Goa (despite years of murky history of litigation for violation of environmental laws) falls short of achieving the main goals of ecotourism. Ecotourism has been reduced to the latest marketing cliché and all these hotels extensively use it to lure the tourist. Unfortunately the hotel lobby has not understood the difference between genuine ecotourism and other marketing strategies. The five-star hotels owned by the non-local individuals have never thought of significantly contributing to the maintenance and conservation of the area. Their environmental consciousness has been limited to throwing crumbs to the locals and eyewash for PR activities.

Eco-tourism cottages near Tambdi Surla put up by a Panjim based businessman



This scant disregard to local environs—both natural and cultural—prevailing in the starred lobby is shared by the hotels in the lower segments. While blatantly cashing on the influx of the tourists, the damaging fallout like abundance of garbage/ plastic is overlooked. The local youths who should be watchdogs have become mongrels of the trade. With the exception of a few activist groups such as *Jagrut Goenkarachi Fauz* and *Bailancho Saad* who were active on certain issues, the awareness or formation of groups on local level to monitor the activity is missing.

A new trend has been to market the Western Ghats regions and its forests as an ecotourism destination. There is a laudable objective in this—viz. that local people should derive benefits and, in a sense, compensation, for

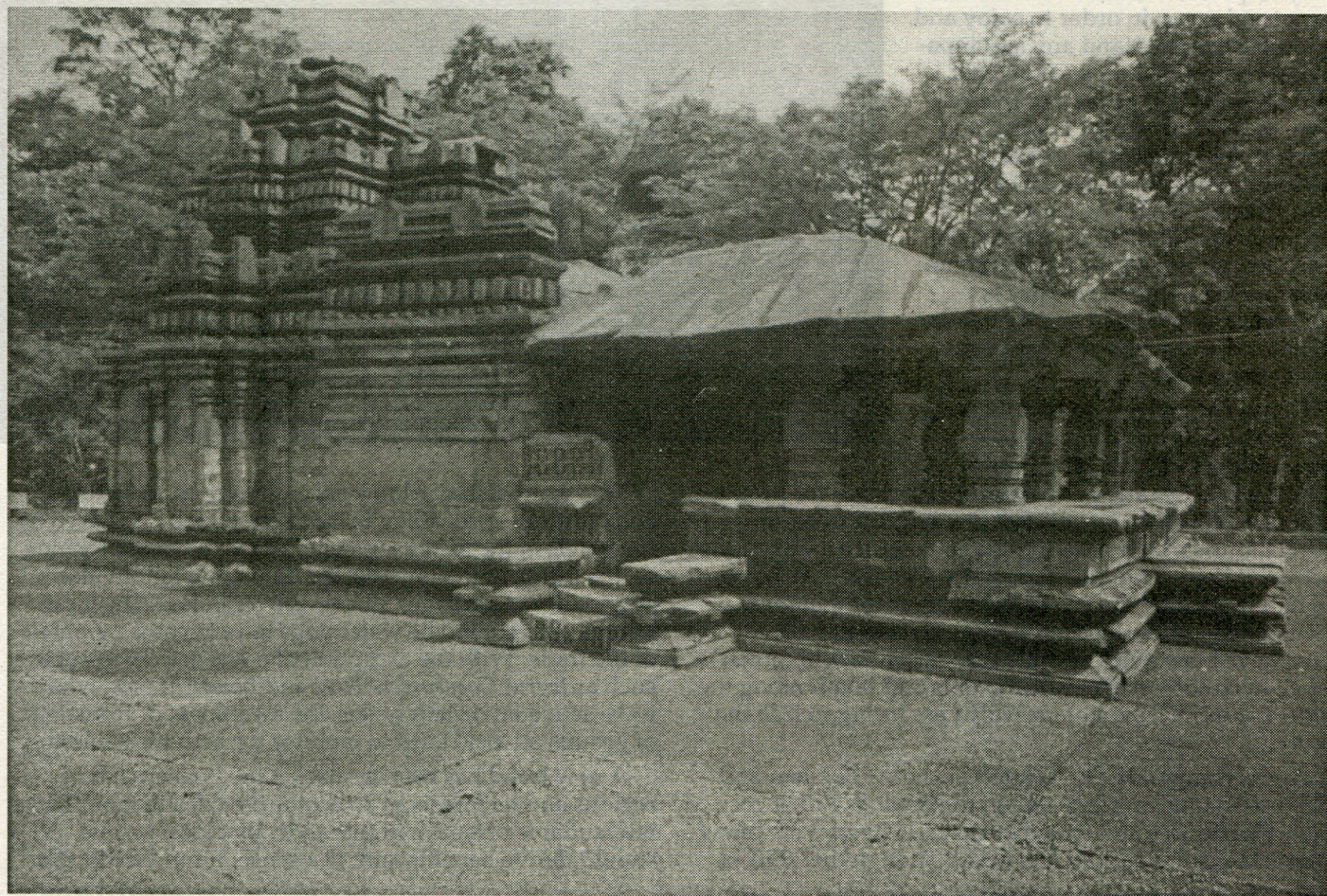
the inconveniences they have to put up when the forests within and around which they live are marked off as sanctuaries and national parks and given various degrees of environmental protection.

But the term 'ecotourism' cannot be used for all tourism in forested areas when such activity provides no measurable benefits to the natural area or the people living close to the areas involved and, at times, directly threatens those same areas. The so-called ecotourist sites have a devastated look after the season, with debris of discarded plastic and other wastes. With the coast already a disaster zone, many new areas in the interiors such as Tambdi Surla and Molem are on verge of becoming target of misconceived ecotourism resorts.

Recently, in the vicinity of Tambdi Surla, new resorts have been set up. As the area develops into a well-known tourist spot, even more such development will take place. Realizing the potential of attracting tourists, it is likely that more infrastructure services and facilities will be developed in the vicinity. Though the present resorts have made use of bamboo and mud huts to create the picture of a pro-nature resort, this is a very superficial aspect. It should be understood that to make it more eco-friendly, many aspects of its functioning will have to change.

The effect of sound pollution can be very easily felt at places like Tambdi Surla and Chandreshwar Hill. The peaceful serene location of shrine in the forest, the sound of water flowing and birds chirping is easily disturbed by the blaring car-tapes of the taxis and private vehicles.

Rock temple at Tambdi Surla



Also, some of the conflicts emerging in the area show that the endeavour has been less than successful in benefitting the locals. Resentful of the fact that 'outsiders' are organising trips to Molem and making big profits, locals stoned some of these buses and have been demanding that they have exclusive rights to transport visitors to Molem.

As more & more of such resorts spring up, slowly the ambience of the place, like a small road curving through the lush green forest around and the remoteness of the place will get diluted, and soon the very basic commodity on which the ecotourist resorts are marketed will be lost. What is frightening is that if the ventures prove to be a commercial success, then in the long run, the primary objective of protecting these areas for the benefit of the wildlife will also be lost.

In the political sense ecotourism can be more democratic, empowering people to take part in decision making, execution and management process. At the moment, ecotourism is either reduced to a marketing strategy (old wine in a new bottle) or a justification for opening up newer areas for tourism. The biggest flaw in our tourism promotion & development is that the focus was and still continues to be on making the tourist spend more & more money without making any effort to ensure that some of this money is pooled back to maintain the tourist sites. It is left to the government and tourism department to manage and maintain the site.

Abhijit Sadhale

Tailpiece: Taverna

One of the abiding images of Goa assiduously marketed by the tourism lobby is that of the taverna, a local bar. The impression that is given is that Goa is a land where liquor flows freely and an inebriated population invites you to join in the frolic. This impression is openly promoted in the advertisements for Goa as a tourist destination and one of the clear marketing points is that liquor is considerably cheaper here than in other parts of the country. The images of the tourism industry find ready support in popular Hindi cinema with their depiction of bars run by the ubiquitous 'Mrs. D'Souza'. The reality, as we all know, is very different.

Due to historical reasons, Goa is one of the places in India where liquor is substantially cheaper than the rest of the country. With a milieu where moderate consumption is not socially unacceptable, Goa can easily be marketed with the lure of wine added to all its other charms. Liquor is openly kept at home to be drunk and offered to others whenever wanted, something unimaginable in most other parts of the country, and you are not considered a reprobate if you have an occasional tippie.

This is fine insofar as it relates to moderate consumption. But the Government and the tourism lobby along with the liquor industry have done incalculable harm to this small state by promoting liquor beyond all reasonable bounds. Having a tolerant attitude towards liquor is one thing—enticing people to over-imbibe entirely another.

Licenses for bars are issued indiscriminately and though there is supposed to be a limitation on the issue of further licenses, a bit of *baksheesh* in the right places usually sets that right. Also, license fees are very low and regulations under the Excise Act restricting issue of liquor licenses within 100 metres of an educational or religious establishment are flouted with impunity. Licenses are also issued without taking into consideration the number of licenses already issued in a given area. Thus, in one by no means unrepresentative village with a population of 2500, there are eleven bars! And not a single restaurant where one could get a hot cup of tea. And this village is not even near the tourist belt.

The figures are absolutely shocking. There is a bar for every 230 persons in Goa, man, woman and child! If one takes into account the retail sale for consumption at home, there is one liquor outlet for every 200 persons. The objective seems to be to rot the brains of the populace with this onslaught.

Laws regarding advertising of liquor are conveniently ignored. Liquor advertisements abound in Goa, and the images portrayed are a powerful inducement to youth to try drinking. All the bars have large signs advertising alcohol hanging prominently outside, and the exteriors of these bars are fully painted with advertisements of liquor companies and their products. Inside, the



decoration on the walls consists largely of skimpily clad women in juxtaposition with a bottle of liquor. Advertisements for liquor adorn all the highways, with complete disregard not only for laws banning the advertisement of alcohol but also regulations prohibiting the display of any billboards within 50 metres of a highway. To get around the former, the advertisements claim in fine print at the bottom to promote playing cards, coasters, key chains, cocktail glasses and even entire bar sets, which, coincidentally enough, just happen to have the same names and logos as well-known liquor brands. A study by the Goa Foundation in 1996 showed that there were 49 large liquor billboards along the highway from Mapusa to Margao, in addition to houses and bars liberally plastered with liquor advertisements. The Government aids and abets this in the name of tourism promotion. During the carnival and other public events, an official exception is made and open advertisement of liquor permitted.

The taxation policy does not help either. Taxes being low, hard liquor prices are 100-200% higher in neighbouring states. A peg of country liquor costs only as much as a cup of tea. And strangely enough, beer, a low-alcohol beverage, is taxed relatively higher and is thus not much cheaper than in adjoining states. This naturally makes drinkers prefer hard liquor to beer.

The social fallout of this regime is enormous. Alcoholism is rampant and many lives have been ruined down this path. Domestic violence after consumption of alcohol is commonplace. Alcoholism is also common among the old and lonely who are left uncared for. There is a high impact on

youth with many taking to regular, immoderate consumption at a very early age. Goa is already a leader in road accidents and drunken drivers, particularly at night, are a common menace. Tourists often come to Goa with the express intention of getting and staying drunk. They create a big nuisance and the much-prized safety of Goa for women is compromised.

Predictably, women bear the brunt of the liquor problem. Alcohol-associated domestic violence is commonplace. Even when this does not happen, women have to cope with less money being available to run the household, as the men are spending large amounts of the income on alcohol. Bailancho Saad, a women's organisation in Goa has been working to organise women against alcohol.

There have been instances of resistance from women at the grassroots level. In the village of Tivrem, the women waged a long struggle against a bar being opened in their village. They were worried that the men's time and money would increasingly be spent there and the ill-effects mentioned above would assume serious proportions. The struggle has been successful till now, but the battle is uphill and arduous when ranged against a state which openly takes the side of the liquor lobby.

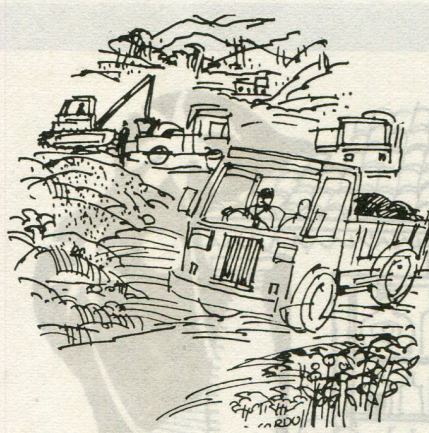
Statistics (1996-97)

Number of shops licensed to sell liquor:

Retail = 6425 (5546 for consumption, i.e. bars, and 879 shops)

Wholesale = 819 (471 IMFL & 348 CL)

Stills = 5633 (Cashew 3991 & Toddy 2242)



Goa is known for its beaches, its churches and its temples but few people know that nearly half the iron ore exported from India comes from Goa.

Every year, the mining industry in Goa excavates some 80 million tonnes of iron and manganese ore mixed with mud from the innards of Goa's majestic mountains. From this, after screening and other operations, some 13 million tonnes become available as saleable ore.

The mining operations are mostly in the Ghat and forested areas. They have seriously undermined the integrity of the Goan watersheds, disrupted groundwater aquifers and tables, destroyed paddy fields, disturbed



Open-cast mining site

Mining

Statistics (1988-89)
Number of shops licensed to sell liquor:
Retail = 8425 (2548 for consumption, i.e. bars and 5877 shops)
Wholesale = 819 (471 IMFL & 348 CL)
Liquor is also common among the old and lonely
consumption of alcohol is commonplace. Alco-
holism is rampant and many lives have been
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wildlife and degraded the habitats of ordinary human beings. Most of the ore rejects descend with the rains into the Goan river systems, creating their own brand of havoc there.

Just behind those beaches, behind those churches and temples, is one of Goa's gravest environmental disasters.

Not a single government has been able to take charge of the mining belt and its lobbies and implement plans for the rehabilitation of the mined areas, or for controlling the indiscriminate pollution of nature. To be frank, most governments have not even bothered to try. There are reports upon reports that describe the environmental problems raised by mining and their impact on public health in detail. But nothing drastic ever happens. *C'est la vie* here in Goa!

MINING GOA FOR IRON AND OTHER ORES

Of all industrial activities within the state of Goa, there is none more destructive of the environment than mining. In its range of deleterious effects, strip or open-cast mining has done more ecosystem damage to Goa than five-star beach resorts or large factories like Zuari Agro Chemicals.

The only reason why the damage has not yet drawn commensurate attention is the fact that most of it is tucked away in the hinterland of Goa, where few people travel to in any case.

Not only are the environmental disasters associated with mining extensive, they are largely irreversible. In many areas, nature has been so fatally assaulted that she may never be able to rehabilitate herself again.

Goa is rich in iron ore deposits. The first prospecting for iron ore deposits was carried out by a French firm 'Compagnie des Mines de Fer de Goa'. This was around Bicholim. Some of these prospecting tunnels can be seen even today. The British Geological Survey of India also visited Goa in 1909 to study the Bicholim deposits. (The occurrence of manganese ore was discovered around 1942). Aware of these finds, the Portuguese Government commissioned a German geologist named Dr. Oertel to produce a geological map.

The Portuguese decree dated September 20, 1906, is the basic law granting mining concessions in Goa. The main features of the concessions under the decree were:

1. The concession was given in perpetuity with the government's role restricted to exercising supervision over the extraction of ores;
2. The right to a mining concession was also recognised as a patrimonial right under the Portuguese constitution.

Such mining concessions were granted by the Portuguese regime to around 600 private parties. Although there are still a large number of private parties involved in the mining of iron ore today, the real control till recently lay essentially in the hands of a few big Goan industrial houses including the Chowgules, the Dempos,

Number of Mining Leases/Mineral Production/Export (1986-1998)

Year	No. of working leases	Production of ore in tonnes			Export of iron ore (Fiscal year)
		Iron	Ferro-manganese	Bauxite	
1986	136	12,654,340	46,553	5,747	13,547,379 (86-87)
1987	138	13,601,579	32,854	15,137	11,232,339
1988	103	12,557,113	20,124	19,950	13,130,348
1989	103	10,439,730	31,263	22,915	11,846,731
1990	80	13,554,258	55,033	21,580	12,708,514
1991	86	12,515,603	51,158	16,272	11,650,358
1992	110	12,035,219	28,472	39,373	12,789,320
1993	112	13,097,816	15,750	43,033	15,158,900
1994	101	15,106,908	30,281	63,166	14,753,892
1995	101	17,175,003	35,607	64,622	14,783,913
1996	93	13,783,842	19,841	76,325	14,476,497
1997	86	17,621,001	20,178	27,872	18,441,931
1998	99	15,521,171	17,581	37,170	15,440,641
1999	98	12,172,925	11,706	32,179	15,139,315
2000	95	15,101,003	9811	31,950	16,072,611 (00-01)

the Salgaocars and the Timblos. In fact, most of these houses got their start through mining. With the profits gained from mining, they have successfully diversified their investments and are therefore no longer completely dependent upon mining. But their roots can very clearly be traced back to the mining boom.

Post-Liberation, in 1961, all new grants of mining leases were made under the Mines and Minerals (Regulation and Development) Act, 1957. The total number of leases granted under the Act is approximately eighty. The Goa Government made several unsuccessful attempts to cancel the mining concessions granted by the erstwhile Portuguese regime. Finally, Parliament enacted the Goa, Daman and Diu Mining Concessions (Abolition and Declaration as Mining Leases) Act, 1987, to abolish all mining concessions granted by the Portuguese and to treat them as mining leases under the corresponding Indian law, with retrospective effect from December 20, 1961.

With the Act, the government acquired full ownership rights and proprietary interests over the mines.

The mine owners promptly challenged the *vires* of the Act in the Bombay High Court, Panjim Bench, and obtained a stay which enabled them to carry on their mining operations. However, the mine owners were directed to go through the process required by law if their mining leases required renewal.

From its inception, iron ore production in Goa has been 100 % export oriented. The first export of 100 tonnes was made in 1947. It reached one million tonnes in 1954,

seven million tonnes in 1968, 10 million tonnes in 1971 and a maximum of 14 million tonnes in 1985. It has remained around 13 million tonnes now for some years. This is roughly 50 % of all exports of iron ore from the country.

Most of the ore is destined for Japan. (See table). The commanding position this country holds in the world iron and steel market, enables it to keep a tight control over prices. One of the richest economic powers in the world still tries to pay the lowest possible prices by pitting one third world country against another.

Thus, prices in the world market for iron ore have stagnated for several years. The export price of Goan ore improved between 1988-1991 from \$9.31 to \$13.17 per tonne. However, the import price in Japan in 1990 (\$26.39) was still lower than the import price in 1982 (\$28.49). In 1992, the Japanese were once again able to insist on a price cut of 6 %.

One important feature of the Goan mining industry is the high overburden to ore ratio which requires a large volume of material to be handled and extensive places for dumping. For instance, a total of 80 million tonnes of material was handled in 1990-91 in order to produce 13 million tonnes of ore.

These high volumes would not have been possible with manual mining alone. The pace of extraction has increased rapidly ever since the Japanese began to dictate technological improvement at mine sites. This has become possible largely through the import of hydraulic excavators, front end loaders, rippers, dozers and dump-

Reserves as estimated in 1980			Barge Fleet Operation			Exports of Goan Iron Ore		
Iron ore	Million tonnes	Year	No.of Barges	Total Tonnes	Average Size	Destination	2000-2001 (in million tonnes)	
Lumpy + 60%	16.47							
- 60 + 55%	45.04	1984	226	115,672	464	Japan	10,103,966	
Powdery ore + 64%	31.17	1990	130	105,563	812	Europe	1,482,076	
- 64 + 45%	386.93	1995	141	145,980	1020	China	2,006,922	
Unclassified ores	47.90	2000	137	167,230	1221	South Korea	787,501	
Total	527.51					Taiwan	468,855	
Manganese Ore	2.5					U.A.E.	126,449	
Bauxite	16.0					Kenya	11,000	
Silica sand	6.5							
China clay	16,000					Total Direct	14,986,769	
Estimated Reserves as on 1.1.85 (MT)							Japan	60,377
Ore	Proved	Probable	Possible	Total		China	1,001,295	
Iron	547.77	611.66	231.28	1390.81		Bahrain	24,170	
Manganese	0.02	2.69	1.97	4.63		Total Goan Canalised	1,085,842	
Bauxite	9.15	11.98	11.13	52.26				
Number of mining concessions				-	596			
Cases referred for forest and environment clearance (Jan. 2001)				-	41			
Number of Applications in Form J				-	411			





ers. The technology transfer has been extremely lucrative for the Japanese heavy earth moving industry.

Naturally, the larger volumes of ore excavated have created in their wake a number of mind boggling environmental problems for which at the present there is no cure, let alone political will for a cure. Since around 80 million tonnes of material are excavated every year, and there is no commensurate plan for locating this material, it is dumped at a number of places from where it leaches directly into rivers, causing havoc in its wake. In addition, as we shall see below, overburdens and rejects have choked up extensive areas of tanks, fields, *nallahs* and river beds. In Assonora and Usgao-Pale, rice fields are now one metre higher than where they were 20 years ago, being completely filled with mud from the mining dumps and pits. Underground water supply springs have been disrupted in many areas, while in places like Usgao-Pale the entire groundwater table has been wrecked. In many areas, large open-cast pits have been left for the wonder (or depression) of future generations.

Much of this reckless behaviour has been possible simply because the mine owners, supported by the Goa Government, have never been compelled to include the environmental costs of mining operations into the costs of producing iron ore. Thus while companies include the costs of wages, removing overburdens and carrying them to dump sites, beneficiation processes, machinery hire charges, water pumping and inventory carrying costs in the price of the ore, no costs are included for rehabilitating the excavated pits and for restoring them to a state from which nature can take over. But just because these costs are not being included in the market price of ore, there is no reason to pretend they do not exist.

It only means that the Japanese and other rich importer-countries get the iron ore at highly subsidised rates since they are not required to pay the costs of environmental damage.

It is not that the environmental costs are not being paid by someone in the long run. Since neither the mine owners nor the importers like the Japanese pay these costs, they must eventually come from the pockets of the Indian taxpayer. Since most of the tax revenues of the State are destined for developmental purposes, there is precious little left over for purposes of environmental restoration. The result is a permanently degraded environment.

Travelling through the mining districts, one is surrounded by hills scarred and pitted by the extensive strip-mining. Trucks transporting ore roar past at break-neck speed. The Mandovi and the Zuari, the two main rivers of Goa, are more or less monopolised by barges transporting the commodity.

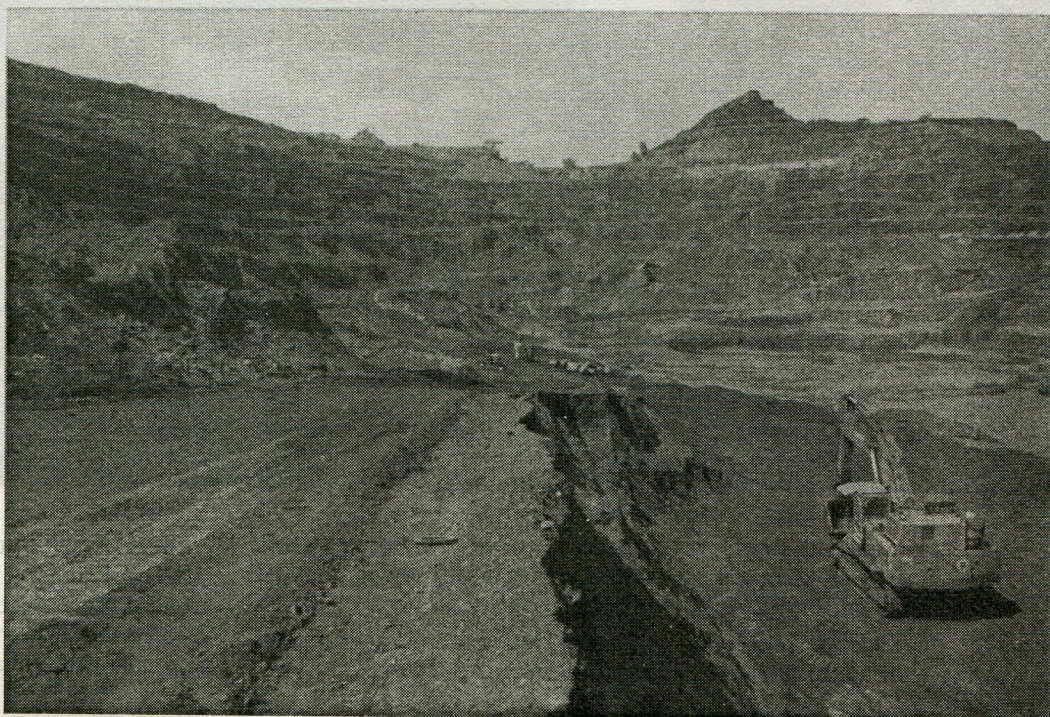
For the people living in the mining belts, life has become a veritable hell. Mining rejects have been indiscriminately dumped and have made their way into the

fields, ruining their fertility. The water table has dropped and wells are dry for a large portion of the year. The sharp decrease of mussels, clams, and oysters in the river basin is due to mining silt deposited in the river beds. Massive siltation and flooding have also occurred. Trucks are washed in rivers and streams, polluting the water supply. No efforts are made at the mines to restore the excavated earth and to treat/cure its ugly pits and scars. The result is overburdens or dumps of waste material adjoining gaping holes in the mined areas. As for pollution control measures installed by mine owners, they are practically nonexistent.

There is no doubt that mining has generated growth in some ways. A fair amount of employment has been created and the initial boost to the Goan economy came from this sector. But the price of this development has been heavy, for whatever ore is extracted is exported, and the profits therefrom go to the mine owners, whereas it is the people of Goa who bear the environmental costs.

It is high time that the mining industry is considered in this framework, because only then can we really understand whether mining has been a curse or a boon to Goan

Will these parts of Goa ever be restored to their natural status?



society, whether it has in actual terms enriched or pauperised Goa. It has certainly degraded the Goan ecosystem, in many ways irreversibly.

The first signs of environmental awareness of the ravages caused by mining were already available by 1972, the year of the World Environment Conference at Stockholm. Organisations like the Indian Bureau of Mines, which had hitherto concentrated merely on the extraction of mineral resources, now began to recognize that the production of minerals was being carried out after all for the well-being of the people and that therefore their environment should not be destabilized.

Several major environmental problems raised by mining operations were now researched and studied:

deforestation, land degradation, air and water pollution, and noise.

Deforestation — In Goa, deforestation was inevitable as more than 350 sq kms of mining concessions and leases are within forest areas of the Western Ghats. The mining companies felled trees with complete abandon till they were halted in their tracks by the Forest Conservation Act, 1980, which forbids the diversion of forests to non-forestry uses unless prior permission from the Central Government is obtained.

According to a report submitted to the Environment Ministry by the Centre for Resources Engineering (April 1992), which conducted a survey during an eight-year period (1981-1989), while mining related activities increased 57.83 sq kms during the period, thick

diverted to permit mining activities. However, a TERI study disputes these findings. Relying on remote sensing data, TERI indicates that some 2528 hectares of vegetative cover have disappeared under the impact of mining during the period 1988-1997 alone.

Instead of recognizing the problems created by deforestation, the mining companies prefer to spend their time decrying the interference of the Environment Ministry.

The Environment Ministry has precious little faith in the promises of the mining companies to carry out compensatory afforestation, simply because the companies still refuse to do it on their existing dumps.

However, it is a good thing that the FCA has completely checked the reckless deforestation by the companies, at least for some time. The notification of the

Netravali Wild Life Sanctuary has also sealed the fate of several mining leases that now fall within the purview of that sanctuary.

Land Degradation — Land degradation due to mining can be categorised into three types:

- 1. Land excavated to win the ore,
- 2. Land used for dumping,
- 3. Land degraded due to mining activity—agricultural and horticultural areas, siltation of drainage, lakes, water reservoirs, etc.

First and foremost, top soil is removed and discarded to allow the excavator to get at the mining seams. Next, the overburden in the form of associate minerals, rocks and other materials is also removed and discarded. Top soil, overburdens and rejects are stacked in places most convenient to the company (not the environment).

All these activities cause extensive and widespread land degradation.

Each year some 30 million tonnes of rejects are generated and stacked in large dumps. In this process a good deal of these rejects are strewn along the roads and they finally settle down in the agricultural and paddy fields and coconut and arecanut groves. It is important to



Brazen mining activity even in residential areas

vegetation, that is, with forest cover over 0.4 density fell by 3.5 sq kms, and moderate vegetation (between 0.2-0.4) dropped by 62 sq kms (see table below).

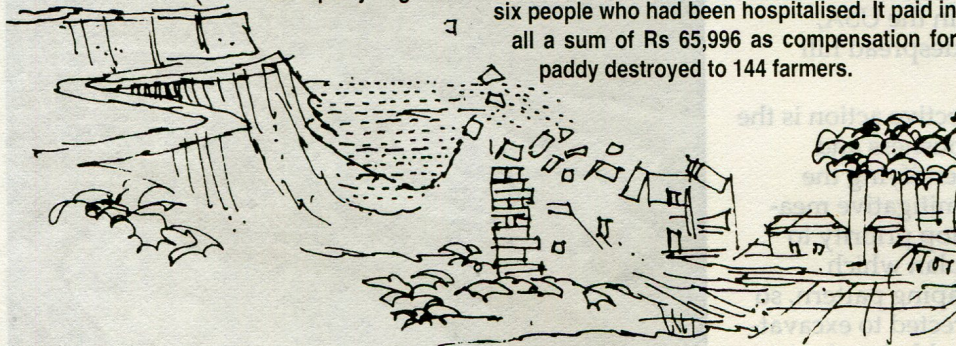
Official data from the Forest Department has indicated that a total of 480 hectares of forest lands have been

Changes in forest cover due to mining in Goa (in sq km)							
Data uses	Mine areas	Crop land	Fallow land	Thick Vegetation	Moderate Vegetation	Sparse Vegetation	Scrub land
MSS81	19.6	101.4	35.8	54.5	277.3	245.0	219.3
MSS84	36.6	95.0	34.2	51.8	268.0	228.6	231.5
TM87	54.9	84.8	46.9	52.7	234.7	198.1	226.0
SPOY 89	77.2	90.2	40.8	51.0	215.3	171.6	243.5
Change in 8 years	(+)57.6	(-)11.2	(+)5.0	(-)3.5	(-)62.0	(-)73.4	(+)24.2

The Dempo Mining Disaster of July 1991

By all accounts it was a weird disaster and, like all disasters of its kind, wholly unique in the chain of events that caused it. Whether it could have been predicted and whether the company ought to have taken preemptive measures is still not known. But four people died, six people were seriously injured and 144 farmers lost the output of their paddy fields.

The disaster was caused when several benches cut into a hillside collapsed. With the collapse, an enormous quantity of earth fell into a water filled depression or pit below. As it was monsoon time the pit was full of water. The large volume of mud that fell into the pit displaced an equally large vol-



ume of water pushing it out of the pit and also giving it a certain momentum. The displaced water demolished a retaining rubble wall taking with it boulders and stones into the fields below. Such was the force of the water that it dislodged several coconut trees and flooded entire paddy fields below. Those who died did so from drowning. When the water eventually subsided thousands of boulders and stones littered the fields, destroying the surrounding paddy crop. As a result of the disaster, the Goa Assembly appointed a Committee with Victor Gonsalves as its Chairman. The Committee visited the site and made recommendations. The Dempo Mining Corporation paid out Rs. One lakh each, to the four persons who had died and Rs 25,000 each, to the six people who had been hospitalised. It paid in all a sum of Rs 65,996 as compensation for paddy destroyed to 144 farmers.

According to the *Valchi Gaotod Shetkari Committee*, affected farmers were paid compensation for both the *kharif* and the *rabi* crops. The debris was removed by the company from the fields and the fields were power tilled by the firm. The Government of Goa also made an ex-gratia payment amounting to Rs 46,000 under the account 'Relief on Account of National Calamities'. In the meantime the company has also backfilled the area that was submerged in mud from the collapsed trenches and planted it with acacia. They have also installed a pump to remove whatever water may accumulate in future in the remaining depression, constructed a new hangwall and two parapet walls close to the agricultural fields below. The area, in fact, now looks like a fortress. How one wishes all these measure had been taken before the occurrence of the disaster and the loss to human lives. The stable door is being closed long after the horse has bolted.

remember that though mining is considered to be the 'backbone' of the Goan economy, its contribution to the Net State Domestic Product (NSDP) has been steadily declining and was as low as 7.7% in 1994-95, whereas agriculture contributes about 20%.

Conservative estimates clearly reveal that over 10,000 hectares of land in mining areas have been covered by mining dust. This has not only destroyed the productivity of these areas, but has also made the land useless for future use. Fields covered with mining rejects, on which paddy cannot be grown, are a common sight in Goa. This has destroyed the only income source of many families.

Coupled with this problem is the utter neglect and disregard displayed by the mine-owners, who bequeath the abandoned mines after use as an eyesore to the community. Nothing grows here and the slopes are routinely prone to landslips, posing a danger to the people of the area. This kind of operation, which plunders a nonrenewable resource and then abandons the land without any thought for the environment is a characteristic feature of iron ore mining in Goa.

It is not that the techniques for reclaiming land are not known. In most other countries, reclamation is obligatory and the mine operator is duty-bound to ensure that the excavated earth is returned to the site and afforestation measures are taken up. The cases of the Utah Copper Mines and the gold mines in Nova Scotia are notable examples of reclamation of land after the mining operations were terminated. In Britain, mineowners are made to contribute towards an Iron Ore Restoration Fund, which provides money for the treatment of worked-out

iron ore areas. During the reclamation process, seeding of surface mine spoils is also resorted to.

Among the various soil reclamation practices are:

- i. The use of mulches such as straw, hay, wood chips and shredded bark. These lower the evaporation rate and supply valuable organic matter to the soil, reduce the rainfall impact, and control erosion.
- ii. The mining rejects and the abandoned mining zone are deficient in nitrogen and phosphorous. Hence, supplements like fertilisers, sewage, sludge, compost, fly ash and farm manure are used to help build the soil quality and fertility.

Closer home, the reclamation measures undertaken by the Kudremukh Iron Ore Company and the Neyveli Lignite Corporation have now met with some success. The most famous example is that of the Sayyaji Iron Ore Works in Gujarat, where the land has not only been reclaimed but converted into an idyll of scenic beauty as well as a source of wood and grass. In Goa, only the Sesa Goa company has done some sustained reforestation work (see page 252).

There is an urgent need for undertaking the reclamation of all the abandoned mines in Goa.

Not only has this not been done, but rejects also continue to destroy the good land in the vicinity. Although the mining industry has afforded a few privileged mine owners colossal profits, it has left the state with severe hazards of environmental pollution and health problems. Research by Dr. Joe D'Souza and others shows that nitrogen-fixing bacteria are drastically reduced in soils polluted by mining rejects. Besides, important soil

enzymes responsible for soil fertility are nearly absent. Iron toxicity has reduced the yield of cash crops like cashew, coconut and cereals.

Some time ago, the Forest Department took over one experimental plot at Pale from the Chowgules and planted acacia and some other mixed species. Some small-scale terracing was also done to prevent erosion and landslips. The Chowgules, Dempos and Salgaocar have also undertaken some reforestation measures.

Forest department officials say that they have worked out a scheme to reforest land that has lost its forest cover due to mining operations. But the mine owners refuse to hand over the concessions to them for reforestation, although the mines are no longer of any earthly use to them!

Time is slowly running out and if reclamation and reforestation activities are not taken up immediately, irreversible erosion may set in. Goa will then become another disaster area like Pennsylvania in the USA, where mining activities have caused widespread hill erosion.

To minimise the effects and seek corrective action is the need of the hour. Environmental consciousness and awareness has come a long way from identifying the adverse factors, to short-and long-term mitigative measures. What is important now is to give top priority to formulating a post-mining reclamation plan which inculcates a suitable post mining landscaping pattern, so that entire mining operations are not directed to excavating the ore bed. The mining strategy should also aim to achieve a suitable post-mining land use of the degraded area.

Mining Dumps — As we have seen, mining in Goa generates rejects. To mine a tonne of ore, two to three tonnes of rejects are removed. As a result about 30 million tonnes of rejects are generated annually.

When one travels through Goa's mining areas, one finds dumps, some of them as large as hillocks: Pissurlem dumps of Damodar Mangalji, Sesa Goa and Fomentos; Surla dumps of V.M. Salgaocar; and Chowgule's Pale dump, to name a few. One wonders at the amount of energy and money spent in creating these dumps, but few would ask whether any attempt has been made towards better management of these dumps.

In the past and even today, what most of the miners do is just this—whatever is not ore is removed and taken



School at Pissurlem finds itself surrounded by industrial mining



Abandoned opencast mining pit

away to pile up in a heap which soon grows into a hillock. This amounts to reversing the lithological sequence found in nature—the laterite boulders and lateritic soil found on the surface goes under the soft clays found below and the dump ends up with a cover of soft manganiferous clays. This means that the useful boulders and soil are buried and cannot be retrieved again. In this small state of Goa, such wastage should be decried.

On the other hand, the softer clay cover is easily washed away by the monsoon, damaging fields and

Mining & Quarrying in State Economy

Quantity and Value of Iron Ore Exported from Goa, 1990-91 to 1996-97

Year	% share of NDP	Year	Iron ore production (Million tonnes)	Quantity exported (Million tonnes)	Share in Indian iron ore exports	Value of ore exported (Rs.Crore)
1986-87	6.00	1990-91	13.55	12.72	37.60%	309
1993-94	8.50	1991-92	12.51	11.65	39.29%	428
1994-95	8.40	1992-93	12.03	12.79	57.68%	531
1995-96	7.00	1993-94	13.10	15.12	56.29%	588
1996-97	5.90	1994-95	15.11	14.71	56.43%	532
		1995-96	17.18	14.49	60.00%	614
		1996-97	13.78	14.14	*	*

* Not available

gardens and silting drains. Discontent among the locals was contained by compensations; some halfhearted attempts were also made to control the washoffs from dumps. Even with the enactment of the Environment Protection Act, 1986, these measures are not taken up very seriously. Only Sesa Goa and Chowgule are known to have recently started introducing lateritic soil cover on the dumps before plantation is taken up. It is high time that concerned agencies and departments revamp the dump management strategies.

The Destruction of Groundwater Sources — The whole approach to mining in Goa is ecologically extremely primitive: 'Here is ore which is of economic benefit to mankind (or rather, to those who wield economic power), let us take it away.' Such a shortsighted approach to mining completely skirts the fact that the ore is fulfilling an important function in its natural state—it is not as if it can just be taken away without causing serious problems.

A study by G.T. Marathe of IIT Bombay attempts to examine what effects the open-cast mining of iron ore has on groundwater. Iron ore mines in Goa have been exploited for over 50 years now—over 200 million tonnes of ore has so far been extracted.

The process whereby groundwater depletion takes place due to mining is well-known. Initial deforestation or devegetation and stripping of top soil at the mining site reduces the filtration capacity of the soil. The effect is an increase in runoff from the site. This runoff washes away more soil, reducing the infiltration capacity further. The fresh rock underneath the soil is also exposed.

Devegetation also increases evaporation from the soil: a combination of these two factors results in a reduction in the quantum of water which normally percolates to the substrata augmenting groundwater supplies.

The furrows caused by open-cast mining create their own problems. These are either temporary and reversible or permanent and irreversible. Most of these mines are located on the hilltops or hill slopes. In order to reach the ore, a large amount of the overlying strata is removed as rejects. The overlying material is laterite or lateritic soils and they form a continuous cap rock in the entire area having an average thickness of 10 m.

The village wells pierce this laterite and the well bottom often ends up in the clays. This lateritic cap rock forms the catchment area for tapping the monsoon water which is slowly released from the upper reaches of the hills to the low lying areas where wells are located. Once this cap rock is removed at the upper reaches of the hills, the supply of water to the wells diminishes; as a result, the water level in the wells is either lowered or the wells go dry early.

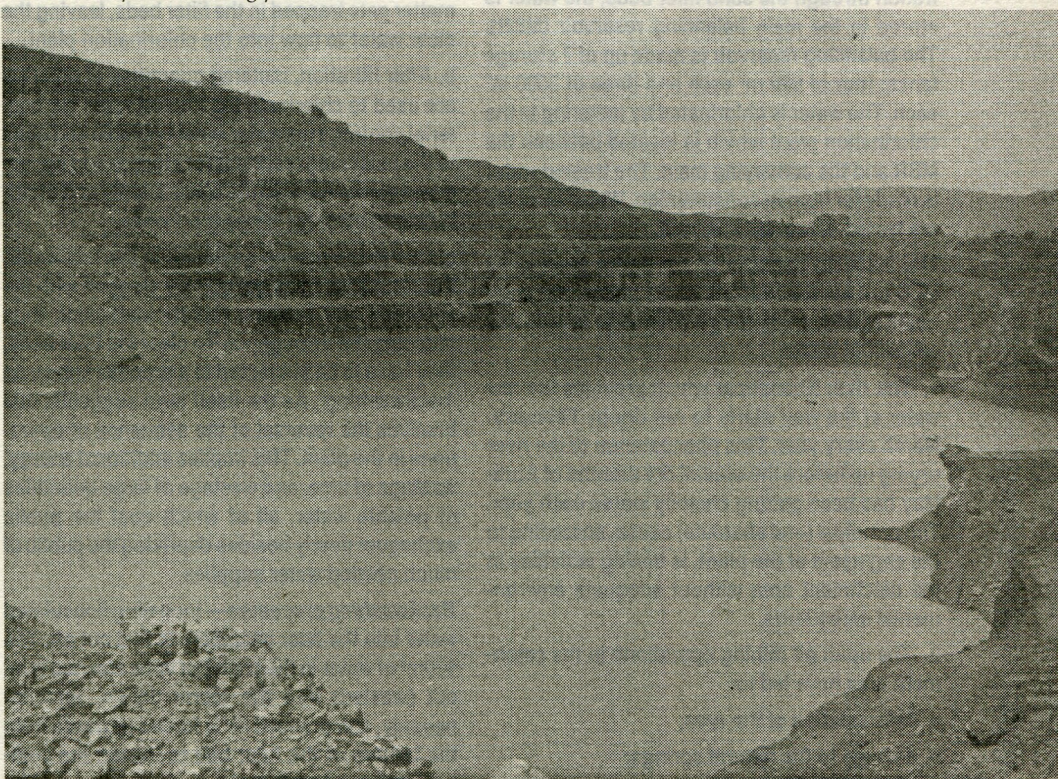
It is not conclusively proved, though, that the water table encountered within the ore bearing horizon is a

confined aquifer, not related to the general groundwater table encountered in the village wells. Though some mines are working below the mean sea level and discharge or pump out very large quantities of water from the pits in order to carry on mining at deeper levels, the village wells are unaffected. Also, at the end of the monsoons, which span over four months, from June to September, these pits are refilled with water. This refilling may not take place to the level where the original water table had been encountered as the hydrostatic equilibrium has already been disturbed.

Regarding perennial springs which were present at the foot of the mines and which have since disappeared, the cause of this problem is solely mining. These springs occur where the clays, which form impervious protective layers on either side of the ore body, are punctured, allowing the water to flow out from the ore bearing horizon through the clays and the pervious laterite.

The hydrological cycle that exists in Goa today is the culmination of the geological processes that started millions of years back. The hydrological regimen, which

Abandoned opencast mining pit



nature has taken millions of years to evolve, has been disturbed in a couple of decades. The entire mining and post-mining reclamation or restoration strategy must be carefully studied in its entirety, on a case by case basis, and particular attention must be given to restoration of the hydrological regimen. Backfilling of pits with rejects, regardless of their composition, may introduce large impervious plugs in the subsurface hydrological cycle, which can lead to more damaging effects that cannot be rectified!

Marathe's study of the northern Goa ore belt between Usgao and Onda records a marked drop in the groundwater level from 55 mamsl (metres above mean sea level) to 35 mamsl between 1960 and 1980.

Impact of Mining on the Opa Water Works

The Goa Foundation conducted a site inspection of the Opa Water Works to assess the impact of mining activities on the public water supply. The visit was conducted on December 4, 1999, after an invitation from the Regional Bureau of Mines. The report, which follows below, was sent to the Government. Predictably, there was no reply.

Our main interest was to study the (ill) effects of mining in the catchment area of Khandepar river on the performance (efficiency) of the Opa Water Works.

The treatment plant which we visited has one receiving chamber, 2 flocculation/sedimentation tanks, 8 chambers with sand filter beds and one chlorination plant.

For cleaning and backwashing of the filter beds, there are 2 rotary positive displacement pumps and 2 rotary twin lobe compressors. After the flocculation/sedimentation in the tanks and filtration through the sand filter beds, the water is stored in the main balancing reservoir (MBR). The balancing reservoir is made up of 7 storage tanks: four of 800 m³ each and three of 3000 m³ each. The water is chlorinated by metering in the chlorination plant which is located between the MBR and the conveying main. The treated water is ready for human consumption. Water samples are tested at regular intervals.

The installed capacity of the entire plant is 72 MLD but for the reasons given below, the engineers at OPA are finding it difficult to supply this amount of water.

1. The river Khandepar which provides the raw water at the weir starts to run dry by February-March every year. This phenomenon of the river drying up before the crucial dry months of April-May has been getting steadily worse each year. The principal (and absolute) cause, according to the engineers at the plant, is mining activities in the catchment area without adequate environmental safeguards.

2. The open pit mining operations in the catchment area have led to:

- deforestation of the area;
- damage to the natural springs;
- reduced the water storage capacity of the surrounding hills;
- increased the runoff during the monsoon with lesser water available for replenishing the underground aquifers.
- Siltation of the Khandepar river bed by the sediment from the mining overburden and low grade iron rejects has also reduced the depth of the river by raising the river bed. Thus the raw water availability in the river has progressively reduced. Each year the storage capacity (of raw water) behind the weir is further reduced.

3. The mining operations have increased the turbidity of the water reaching the treatment plant. The turbidity of the Khandepar river when

measured at Dudhsagar before it enters the mining area is 5 ppm, but after it crosses the mining areas this figure goes above 3000 ppm. The laboratory maintains a careful record of turbidity levels and these are entered in a register. The register disclosed several days when the turbidity levels were in the 1000 ppm range. When the raw water is of this quality it causes serious problems at the water treatment plant which we now discuss below:

a. In the normal sequence, raw water is pumped from the Khandepar river to a receiving sump at the treatment plant which is situated on a plateau. This water is fed into two flocculating/sedimentation tanks. Through a mechanical process, the heavier particles in the water are separated. The relatively clear water is then fed into eight chambers where the water is allowed to seep through layers of sand by gravity. During this operation, the lighter, smaller particulate matter gets trapped in the filter beds, leaving the clear water to flow into the chlorination plant.

b. After filtration, metered quantities of chlorine are used to chlorinate the filtered water for bacterial control. This water is now potable and goes to the balancing reservoir for storage and subsequent discharge into the water supply and distribution system for Tiswadi & Ponda.

c. Due to the mining sediment in the raw water, the sand filter beds get quickly clogged with the sediment and become rapidly inefficient, thus reducing the throughput. To clear the filter beds, they have to be subjected to a process known as 'backwashing'. As the itself term suggests, this involves the reversal of the sequence of operations in the plant. This implies additional energy, wastage of time, and wastage of large quantities of potable water, all of which cost the public exchequer dearly besides depriving the public of much needed water supplies.

Backwashing procedure—Incoming flocculated water into the filter chambers is first cut off. The 400m³ of water in the chamber to be cleaned is let out (wasted) into the storm drains. Simultaneously, compressed air is forced upwards from the bottom of the filter bed to loosen the compressed sand and make it more porous. The compressed air is then turned off and potable treated water (600m³) from the balancing reservoir is pumped back through the filter beds. This potable water flushes out the mining sediment trapped in the sand, and is discharged together with the sediment into the storm drains.

Backwashing of just one chamber uses up 600m³ of potable water and 400m³ of flocculated water, thus a total of one million litres. Everyday—largely during the monsoon and for some time thereafter—four chambers are backwashed using 2.4 million litres of fully treated water and 1.6 million litres of partially treated water. This naturally reduces the capacity of the 72 mld plant by 4 mld.

A further reduction in capacity occurs because the chambers are rendered inoperative during the backwashing sequence. This further reduces the throughput of the plant by another 1 to 1 mld.

This means that the public distribution system (and therefore the public) is not only deprived of approximately 5 million litres of water a day but the government is deprived of revenue to the tune of about Rs 1.5 lakhs per day (@Rs 30 per m³). We are using the commercial rate since domestic rate is subsidised.)

Backwashing also involves other costs: wear and tear on 2 pumps, and of 2 compressors and valves at the treatment plant. It generates more work for the personnel and increases consumption of electrical energy which is in short supply all round. It also involves similar costs incurred at the pumping station which pumps raw water from the Khandepar river to the Opa water treatment plant.

The damage caused to the water supply by mining operations in the catchment area is thus both qualitative and quantitative in nature. Huge costs have been incurred in the treatment process (including energy charges). However, some of the filtered water (2.4 MLD) cannot be sent to consumers because it must be used instead for backwashing of the filter beds and therefore wasted in the process. The costs are phenomenal and borne by lakhs of people who are perhaps not even aware of it.

The engineering personnel were unanimously of the opinion that they could greatly improve the plant performance both qualitatively and quantitatively with the cooperation of the department of Industries and Mines, Regional Bureau of Mines and the various mining companies operating within the catchment area of the Khandepar river upstream of the Opa weir.

The problem of mining pollution affecting the treatment plant works has been discussed for years, by several committees including a House Committee. But the mining silt continues to get into the raw water, and to damage the efficiency of the sand filters. This kind of damage is unacceptable and is clearly against the public interest. It is also bad economics, involving in addition wastage of a valuable, diminishing essential resource. A time-bound programme of action is desirable. The Regional Bureau ought to take stringent measures so that the problem is contained or vastly reduced.

It appears to us that it is necessary that the mining companies operating in the catchment be made to compensate for the damage to the Water Works. In addition, as a precautionary measure, they ought to be restrained from establishing any further dumps or opening any further pits for mining operations in the catchment.

Claude Alvares/Anthony Simoes

Selaulim Water Works

Impact of mines on Selaulim water

When the water from the Selaulim Dam was first supplied to Margao in the late 1980s, consumers complained of severe darkening of containers including baby feed bottles, sulphide smells, discoloured water and peculiar taste.

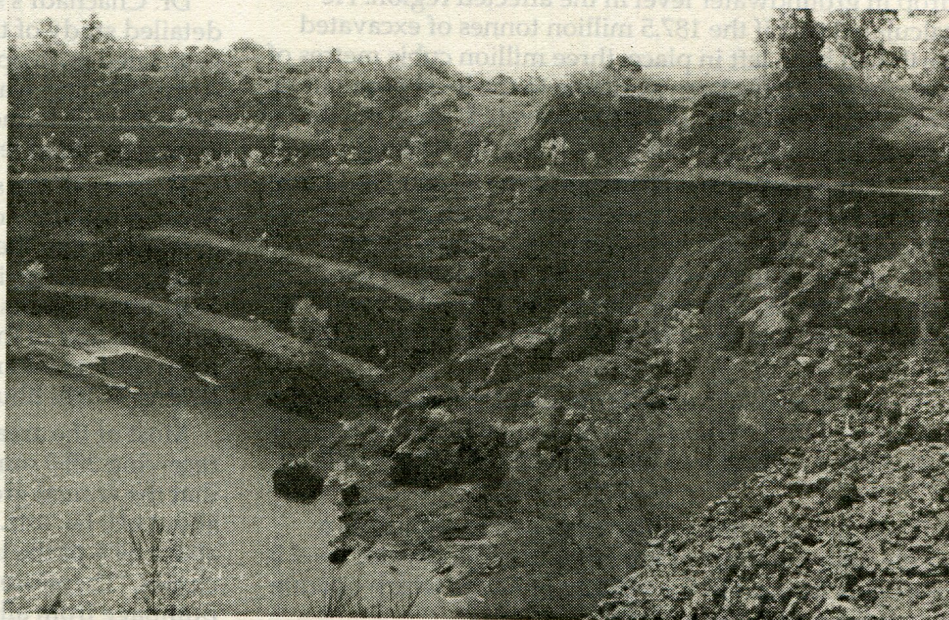
The Government of Goa thereafter asked NEERI (Nagpur) for expert advice. NEERI visited Goa in 1990, had samples taken and eventually produced a study report on raw water of the dam. The report established that in the surroundings of the catchment area of the dam there were several iron and ferro-manganese ore mines which were contributing large quantities of discarded slimes to the water.

Besides, the vegetation in the area had not been cleared prior to the inundation. The vegetation had begun to decay, creating additional problems. The resulting acidic water possessed the power of dissolving iron, manganese and other toxic metals from the leftover slimes. Dissolved oxygen in the water, as it entered the treatment plant, was 1.8 mg per litre, which was quite low. Levels of iron and manganese were above the permitted levels.

The report concluded 'It is unusual that manganese is higher than iron in the reservoir water.' If it is really so, a thorough examination of the water over a period is necessary for remedial measures with such large concentrations of manganese. Health and aesthetic reasons apart, it is well known that iron and manganese will lead to irreparable deposits on filters and in distribution mains and can prove troublesome and objectionable. The NEERI report described the water treatment plant as follows: 'The WTP presents a depressing picture of the filters, filter galleries and even aerators. Product surfaces are coated with reddish-brown deposits. The white tiles are all pitch dark in appearance. Accumulation of slimy and dark coloured deposits in the water channels, filter beds, wash water gutters and pipe gallery are a sight, parallel of which is difficult to record. The poor condition in respect of the best efforts of the water works staff to maintain this plant is directly contributable to the quality of water in the dam.'

As with the Opa Water Works, the depressing situation is reflected in the case of Selaulim as well. The original Selaulim scheme was designed to produce 160 mld. However, due to choking of the filter beds, the plant can only generate a maximum capacity of 120 mld. To get by this problem, the Goa Government invited bids in 1996 for a second pipeline to take water from Selaulim to South Goa. That scheme has not yet been finalised and at 1996 estimates was to cost some Rs 204 crores.

Sunderlal Bahuguna



Deserted mining site under severe degradation

Noted environmentalist Bahuguna visited Goa in 1985 and recorded his observations on the environmental impact of the mining activity in Goa.

Goa was one of my dream lands before I actually visited here. But when I came, instead of a clean sea and green hills I saw polluted sea and brown hillocks, scars created by the mining industry on the body of Mother Earth. My dream was shattered. Nature has been bountiful to us, but human beings have in return been cruel to her.

The major problem facing this territory is deforestation. Goa is one of the few places in India where we have wet and moist evergreen forests. These forests, which once covered the hilltops, regulate the climate of this area. These are the mothers of our rivers and the factories of soil manufacture. The prosperity of fertile valleys depends on the dense forest cover in the hills. The common village lands, which were once covered with greenery, are barren today. There is nobody to check encroachment over these lands. Whatever forest area remains, it is threatened with destruction by mining, the setting up of industries (as we see at the Kundaim plateau), and creation of plots for buildings (near Ponda). All this is being done in the name of development.

Mining, which is regarded as the backbone of Goa's economy, has done utmost harm to the ecology of this area. I cannot imagine that any government which has some rules and regulations can allow the rape of the earth in such a cruel manner. At many places, from Palolem (in the South) to Sirigao (in the North), vast areas have been converted into heaps of mining waste. The earth is dead. The poor villagers, who are kept under the delusion that this industry is providing a livelihood to them, get ultimately dust and disease. Their lands have lost fertility. The cashew, coconut and other trees are like the villagers—dying a slow death due to accumula-

tion of dust. Water sources are drying up. The rivers are flowing with mineral rejects, some of which are deposited in the paddy fields. The rest goes to the sea. According to the studies conducted by the National Institute of Oceanography, the mining rejects have adversely affected the fish life. Previously, bottom deposits of sandy mud provided an ideal habitat for the clams. But within the last ten years, the sandy mud-type deposits have been covered with red clay and pebbles. The study reveals, 'The observed depletion of clam resources is a consequence of mining activities.' The scientists have warned, 'Unless abated, the total extinction of estuarine biota may be a matter of time!'

Now, for Goans, it is the question of their survival. As Anant Ganpat Paidarkar, former sarpanch of Pali-Bicholim told me: 'We demand nothing from the government, only fresh air and clean water—the two free gifts of nature.' At least one person dies of T.B. every month in that panchayat, according to him.

It is said that the iron ore deposits of Goa will be exhausted by 1999. Even if these were to continue for many hundred thousand years, should we allow an activity, fatal to the health of human beings and the earth, to continue? Mining in Goa should be stopped forthwith and the denuded areas should be rehabilitated with vegetation. All labourers employed in mining today should be engaged in planting trees, and ultimately these trees should become their source of permanent employment.

Social activists, humanitarian scientists and compassionate literary men, artists and journalists should join hands to launch a people's movement to stop the rape of the earth, protect the environment and implement a programme of true development.

On the basis of the data, he made an attempt to correlate the volume of excavated earth and corresponding drop in groundwater level in the affected region. He calculated that if the 187.5 million tonnes of excavated earth had been left in place, three million cubic metres of water would have been available to the local population. Thus, for every tonne of earth excavated, there is a loss of 0.08 m^3 in storage potential and 0.016 m^3 in specific yield.

The topography and drainage of the Usgao-Onda iron ore belt leads one to the conclusion that an area of 15 sq kms may be assumed to be forming a single, largely homogeneous, unconfined aquifer. The drop in the groundwater level in any part of the aquifer is bound to affect the groundwater level in every other part of the aquifer.

Thus, the annual loss of groundwater due to mining amounts to 0.18 million m^3 . The annual loss in storage is 0.84 million m^3 and loss in specific yield is 0.168 million m^3 .

Though the entire aquifer responds to stimuli as a single unit, the effect of lowering of groundwater level is more pronounced in the vicinity of mines which operate below the groundwater level.

Marathe closes his paper by pointing out that detailed studies of groundwater flow patterns are necessary before any corrective measures can be undertaken. But all options have to be weighed against the damage to the local groundwater regime.

Marathe's study on the impact of open-cast mining on watersheds in Goa is mirrored on a specific level by

micro-level study conducted by Dr. A.G. Chachadi of the Goa University conducted in Pissurlem area in Sattari.

Dr. Chachadi's study is in fact the first elaborate and detailed study of the impact of dewatering activities associated with open-cast mines. It was conducted in April 1997 and was based on sampling of water levels in several wells in the area. The data was then subjected to computer aided techniques.

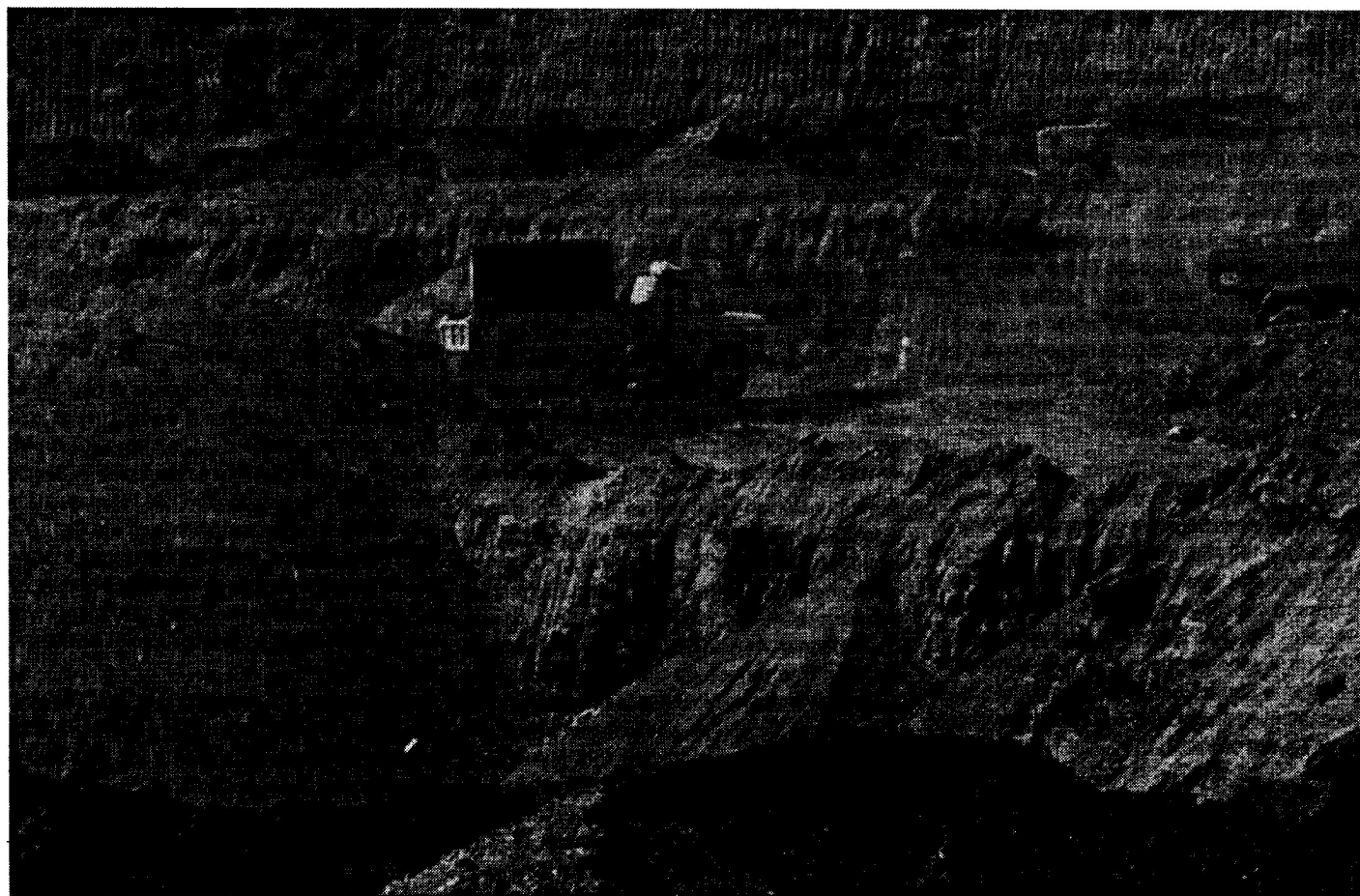
The area of the study was the catchment of the Kudne River, a tributary of the Valvon River. Both these rivers eventually join the Mandovi River, south of Sanquelim. The Kudne River in fact forms a sub-catchment of the Mandovi river. Its total catchment area is 4325 ha. The southern half of the catchment is the mining belt. The main settlement areas are Harvalem, Onda, Pissurlem, Kudne, Saleli, Bhuipal and Gaothan.

Most of the area is thickly vegetated, with the area receiving 3750 mm of rainfall. Dr. Chachadi estimated that the annual groundwater pumpage works out to about 610 ha. mts. drawn from just three mines. This is about 44% of the total groundwater storage. He concludes, 'Therefore the total volume of groundwater pumpage from all the mines seems to be alarming.'

Dr. Chachadi also examines the impact of mine dewatering on river base flow. In his words:

'Under natural conditions the rain water percolates down into soil and slowly emerges at the stream banks as lean-period flow or base-flow. As most of this flow emerges after the rainy season, this forms an important resource for various purposes. In Goa most of the mines

Active mining site at Sonshi



are located in close proximity to the rivers. When groundwater from mine pits which are far below the river bed level is pumped, the base-flow getting into the river is cut off; besides the river bed itself may go dry if the mine is very close by. The mining in Goa has not only diverted the base-flow component from rivers but the nearby surface water bodies, springs and even soil moisture in nearby agricultural lands have been depleted. The shallow root plantations like coconuts cannot survive if the soil moisture goes below a metre depth. The cases of degradation of shallow-rooted plantations have been witnessed around the mining pits.

'When groundwater is pumped from the pits, it is let into a settling pond (most of the times these are ineffective) from where water is discharged into agricultural lands or river beds before complete settlement of suspended materials. This has led to the choking of river beds and silting of once fertile agricultural lands, turning them into waste barren lands (may be an intentional activity of the miners to retrieve this waste agricultural land for future mine waste dumping).'

His final conclusions are that the groundwater pumped from the mine pits comes from both shallow, unconfined and deep confined aquifer layers. The shallow aquifer water levels are affected due to mining. The linkage between mine pit water and the aquifer water is more than evident. He concludes his study with recommendations for short term and long term measures. These were made part of TERI's recommendations. The government could not be bothered.

The Mines Pollute the Surface Water as Well — Again, the major water polluting agent in Goa is the mining industry. Ten of the large mines are located in the Zuari basin, while the remaining 27 are in the Mandovi basin.

Iron ore mining involves the removal of the thick mantle of overburden consisting of laterite clay, manganiferous clay and phyllites. The average ore-to-reject ratio ranges between 1:2.5 to and 1:3. With an average annual iron ore production to the order of 10 million tonnes, about 25 million tonnes of rejects are generated.

A comprehensive survey by the Indian Bureau of Mines in 1981 estimated the mining rejects of active dumps and clay dumps to be to the order of 46 million tonnes and 96 million tonnes respectively.

The heavy monsoon runoff carries the overflow and wash-off from these enormous quantities of rejects into the neighbouring land and water systems. Besides, slime and pumped-out turbid water from deep mining pits aggravate the problem.

According to a study by Dr. Parulekar (NIO, 1973), these mining rejects are transported downstream of the rivers and about 11 % of them settle in the sediments at 0-5 % salinity and about 21 % sink to the bottom at 15-20 % salinity.

Another study by Dr. Sen Gupta (N.I.O., 1973) estimated that about 70,000 cubic tonnes of iron particulates are deposited every year in the Mandovi river.

The siltation problem is acute in the Khandepar river, which is a major source of water supply to Goa (see box for detailed GF report on Opa). Among the numerous mining leases in its basin are Codli-Quirlapale, Bimbal-Sigao and Tathodi. The river is extensively polluted during the



Abandoned mining site under severe erosion.

monsoon wash-off from the dumps of these mines. In some cases, the dumps directly touch the river banks.

Besides, the silt from the river chokes the filter beds of the Opa water works.

Bicholim mine rejects and wash-off pollute the Bicholim river, while the Onda/Harvalem river is severely polluted by wash-off from the Pissurlem-Sonshi, Devlem and Cudnem mines, to such an extent that the famous Harvalem waterfalls are in danger of drying up. The Pale mines' washed-out materials flow into the Madei river. The nearby settlements that use these sources of water are adversely affected by this widespread pollution of water systems. Village wells are also adversely affected due to the percolation, pollution and disruption of the water table.

Mining activity is also responsible for pollution of water by oil and grease. Almost the entire iron ore production is transported by barges over the Mandovi and Zuari rivers to the Mormugao harbour, over a distance ranging from 40 to 70 kms. About 300 barges, on an average, are estimated to be plying on the rivers per day.

Major mine owners also maintain their engineering workshops along the banks of the rivers. The quantity of grease released by the above sources, in addition to bilge disposal from barges, adds up to about 100 to 250 kgs grease/mine. The range of concentration of oil and grease pollutants in inland water is between 0.2 to 9.2 mg/l, with occasional high values.

Nitrates are among the other water pollutants released by mining activity. They originate from ammonium nitrate, which is used in explosives. Approximately 10 tonnes of ammonium nitrate are used per month.

Washing and cleaning of mining trucks is another source of water pollution. These trucks are mainly used to transport the ore from the mining site to the river loading point or a rail head, the distance involved being between 5 to 20 kms in the north and often as much as 50 kms in the south. This provides an indication of the vast magnitude of water pollution caused by their washing. For instance, the Harvalem river waters are no longer crystal clear, as they once used to be.

With a view to minimising damage, including water pollution by mining rejects, mine owners should be

compelled to launch a well planned, time-bound crash programme of intensive plantation of suitable trees on the dead dumps and abandoned mines on scientific lines, in order that the dumps are stabilised and the wash-off intercepted. A peripheral belt of trees around the mines should also be created. Construction of check dams, settling ponds and water filter beds should be accelerated, to arrest the flow of mining wash-off. No mining dumps should be allowed in the vicinity of rivers.

Mining and Floods — The current decade has witnessed the appearance of a new problem in Goa: regular floods. This is an entirely man-made problem.

Nature, on her part, has blessed Goa with a conjunction of various factors which made the occurrence of

The most serious analysis to date remains that of an expert committee, comprising representatives of the PWD, Captain of Ports, Directorate of Mines and Industries, and the Agriculture Department, which was set up to investigate the heavy flooding experienced in Bicholim on the night of June 13, 1981. That flood caused considerable damage to houses and property. The committee visited Bicholim town and made a survey of the problem. The report submitted by the committee was a clear indictment of one of Goa's major mine lessees, M/s V S Dempo Limited. It stated:

'In the catchment area of the river lie some mines, where mining activity is being undertaken for the last 30 years or so. Because of mining, developmental activity and deforestation occurring in the catchment area of the river, the soil mantle gets displaced, with the result that loose soil finds itself transported by the rain waters to the watercourses.

'Because of the steepness of the bed slopes in the upper reaches of these water courses, the carrying channel acquires considerable velocity, which is further scouring or eroding the bed of the channel. However, when the river or water course traverses flat terrain, the velocity gets reduced and the material which is carried in suspension gets settled in the channel causing silting and reduction in the carrying capacity of the channel, resulting ultimately in the overflowing of banks and inundation of low-lying areas along the banks.'

Country craft earlier used to navigate right upto Bicholim town. But now there is a draught of hardly 10 cms, which means that siltation has caused the river level to reduce by at least 90 cms.

Conclusion — Despite the enormous costs laid at the door of Goa's environment by the mining industry, no effort has been made by any agency to measure these costs and have someone pay for them. As of today, Goan society at large either pays these costs or absorbs them, while the mining barons remain unaccountable.

The Government of Goa still remains respectful of mining barons even though mining no longer contributes as significantly as it once did to the economy and employment. The entire mining sector in fact contributes not more than Rs 10 crores to the State exchequer. In exchange, the State only gets larger and larger headaches.

Efforts of the public to get redress remain futile since the authorities by and large remain sympathetic to the interests of the mining companies. Mining still remains a sacred cow with Goan administrators.

Fortunately, the High Court has taken a different line in dealing with rampant cases of pollution and nuisance. It has ordered site visits, commissioners' reports and issued directions in those cases that have been brought before it for relief.



Another Goan lunar landscape created by mining

floods an exception, though no longer. All the rivers in Goa (but for a few exceptions) have an east-west flow. The channels of all these rivers are stable and deep. Though the bigger rivers handle quite a large flow of water, they are quite short in length. Finally, the sea is close by.

But the depredations of man have caused this picture to change. Earlier, only two areas of Goa used to experience regular flooding—Paroda village and a part of Sanquelim town near the old market. But during the last 15 years, and particularly since 1980, several parts of Goa, and notably the town areas, are getting flooded even during times of normal rainfall.

The single biggest cause of this problem is, predictably enough, the mining industry. There are a number of other causes, like increasing agricultural activities in the catchment areas of various rivers. These are related to the increasing population and the consequent increasing pressure on land. These factors definitely contribute to the problem, but it is a fact that the major cause remains mining.

MINING AND DUST

Curchorem and Sanvordem are a small town (with a Municipal Council) and a village (with a panchayat) respectively situated in south Goa. They are located opposite to each other on the banks of the river Zuari and are connected by a bridge. Because of their convenient location, most of the ore produced in south Goa's mining belt (and more recently from Hospet, in Karnataka) is rehandled here for shipment by barges to Mormugao Port.

Curchorem is also a railway station. Due to the rapid growth of its population, it was reclassified as an urban settlement in the 1981 census. But for the past two decades, it has had a more dubious distinction: it is the capital of mining dust pollution in Goa.

Throughout the day, the streets of Curchorem-Sanvordem reverberate to the roaring of trucks transporting ore to the riverside plots at Capocem, Digni and Xelvona, where the ore is stacked and from there, loaded into the barges.

The trucks are paid by the tonnage of ore they transport, which means that the operators are interested in maximising the number of trips they make per day.

In the process the trucks raise large quantities of dust, which enters people's houses and adds to the considerable misery of the inhabitants. Villagers complain that houses have to be washed several times a day to get rid of the film of red dust. But how do they get rid of the dust that they breathe in every moment, day and night? Many of the children of the area have fallen prey to innumerable lung diseases.

The trucks transporting the ore do so on a continuous basis, day and night. When ore is transported in open trucks with no speed limits enforced, it spills over and flies into the atmosphere, settling on the public roads from where it is bound to rise again as more trucks pass. How long can people stay indoors with their doors and windows shut?

The Curchorem railway station is the second major source of air pollution—in addition to the transport of ore by Goan mining companies, large quantities of ore are brought in by the railways from other parts of the country like Karnataka by the Minerals and Metals Trading Corporation and other organisations. This ore is dumped in the railway yard in an open area, further aggravating the air pollution. Thus, the station area is perpetually shrouded in a gloomy pall of ore dust. A large area around the station is dirty red in colour due to the accumulated sediment.

The station is the centre of intense activity, with unloading, and stockpiling and reloading of iron ore brought from up country (Bellary-Hospet) area.

It is not as if the dust pollution is caused by the simple onetime unloading operation, though even that would not be permitted in residential areas and to the detriment of citizens' health. However, at Curchorem, the unloading and loading operations are carried out several times over, as 3-4 trains, each with 55 wagons carrying iron ore ply the route every single day.

The wagons bearing the iron ore from Karnataka are

first unloaded manually by workers using shovels. The workers wear no protection at all. All the ore is simply unloaded on the ground, generating clouds of dust. Excavators next scoop up the material and dump it into waiting trucks, raising fresh clouds of dust. These trucks drive out of the yard onto the roads in the town and take the ore to places in or around the town, where it is stacked in huge piles for several days or months, till it is required for loading. Thereafter, it is once again scooped up in trucks to be loaded into barges. There could not be a more wasteful, harmful and inefficient way of conducting these operations.

The most sensible option is clearly for the ore to be taken directly to the port and loaded on board the ships for export through use of the already installed mechanised ore loading plant within the port. In all ports in the country, ore is taken directly to the port and loaded in this manner. The Mormugao Port, which is a public authority set up under the India Ports Act, 1908, had a mechanised ore loading plant and used to load ore in this manner. However, for reasons best known to the port authorities, the ore loading plant has been unoperational for some years and the port authorities are no longer interested in the ore. (There is also the fact that the trucks and barges transporting the ore would be put out of business if the ore went directly to the port: there is a powerful lobby of truck companies and barge-owners who want the present system to continue). The port authorities have no intention of repairing or upgrading

The unqualified misery of iron ore dust pollution



the ore-loading machinery but prefer to let it rot, simply because the dust pollution in the port caused by the mechanised ore loading operations was causing nuisance to the port authorities and the residences within. On the other hand, there is no concern for the citizens of Curchorem, who have been subjected to such pollution, perhaps because they are considered second-class citizens in the state.

It is absurd that when there is a direct broad gauge line that runs all the way into the port, and despite ore loading machinery being available in the port, the authorities are allowing the companies and transporters to unload the ore at Curchorem, reload it on trucks, unload it on the river bank, reload into barges and then send these all the way to the ships. Besides being an

unnecessary and inefficient manner of using the country's precious oil resources, this convoluted system is damaging the health of the citizens of Curchorem beyond redemption.

To the stray traveller passing through, it is a matter of only passing interest. But for the citizens of the town, the pollution has become a matter of life and death. And for over 30 years, they have knocked on every door in the corridors of powers, pleading with the officials to do something to save them but to no avail.

In Curchorem, citizens' committees were formed, protest demonstrations organised and angry letters dashed off to mine and truck owners and operators, and to local newspapers, the Chief Minister, the railway authorities. They threatened and carried out *rasta rokos*

citizens had abated to some extent. Committee after committee was formed by the government, reports churned out in a stream, but the problem remained, in fact it got worse, as the consignments of ore being transported simply increased every year.

In 1989, Shital Kumar Kakodkar, an advocate, joined by Suhas Sanvordekar, a journalist, approached the High Court with a writ petition praying for directions to the truck-owners to stop the carrying of ore in open trucks both dry and in slurry form, as well as dumping of ore in Curchorem town.

The petition was admitted but thereafter, it appears, the court directed that the parties dealing with the transport of ore should also be made parties. The total number of contractors furnished by the mining companies was 143. The petition seems to have been grounded at this stage since the petitioners were not in a position to join an additional 143 parties in what was basically a public interest petition, in addition to the 23 parties they had already joined as respondents.

The petition remained as court arrears. The citizens thus received no relief even from the courts despite the PIL.

Since a large number of the over 26,000 people in Curchorem suffer from respiratory problems due to dust pollution, the Goa Foundation decided to get involved. The Foundation wrote on 18.1.99 to local doctors asking them for their opinion on the problem. They were unanimous that the presence of dust pollutants in the town had led to an alarming increase in morbidity patterns manifest in an increasing number of respiratory illnesses.

The dumping of the ore by the river bank was illegal. No activity of this kind can be carried out within 100 metres of all river banks in India, as per the approved Coastal Zone Management Plan prepared under the provisions of the CRZ notification. The river bank has mangroves which are designated



High school students work in a dust filled atmosphere at Sanvordeem

and often blocked the roads with stones and boulders. Unfortunately, the effect of these actions has been generally temporary—in reaction to the anger of the citizens, some perfunctory pollution control measures were implemented, only to be given up once the wrath of the

Heavy Barge Traffic

This is a well known phenomenon and is suspected to be the major cause of erosion and consequent deterioration of external bunds. A majority of *khazan* lands in Bardez, Tiswadi, Ponda, Bicholim and Salcete talukas have been affected due to heavy barge traffic. In the Mandovi river, the barges ply from the loading points to Mormugao harbour and back, approximately 1,500 times per month for a period of 8 months. The frequency is the same for barges plying in the Zuari river. In the Cumbarjua canal, barges ply during the periods of foul season or the monsoon months—from May 21 to September 15. Since this canal is narrow with low draught, only barges

of 650 DWT and of dimensions not greater than 50 metres of length and 9 metres of breadth are allowed to navigate. The frequency is 300 times per month, to and fro.

It was found that in the mining belt, there were as many as 84 loading points before liberation, of which about 57 are currently in operation. On the Zuari river, from Nirabag to Xelvona, there are 20 loading jetties; on Mandovi river from Usgao to Amona, 25 loading jetties, between Pilgao to Virdi, 7 loading jetties, and on the Tivim river 5 jetties are located. The external embankments and the *khazan* lands in the vicinity of these jetties are prone to severe erosion as observed by the Panel at Amona, Piligao, Sarmanas, Tivim, Old Narve at Divar and near Shiroda.

In North Goa alone, the barges make approximately 15,000 trips per year from the loading points to harbour and back. In South Goa, this frequency is 18,000 trips per year. The 'bowshock waves' caused by barges is the main reason for increase in wave energy, which is a function of the cruising speed and load of the barges. The narrow channel of Cumbarjua faces the major brunt as this energy is not dissipated easily. External embankments barricaded by natural mangrove vegetation are better protected from barge traffic than exposed ones.

Agricultural Land Panel Report

CRZ-I in the approved CZMP. The land on which the ore is stacked is revenue land and no permissions have been procured from the authority under the Land Revenue Code. The dumps are placed among the residential houses and as the windows and doors open practically on to the dumps this brings dust and iron ore fines into the homes which gets on every surface of the residence, including the clothes and the food. This has been the status of the environment of the people of this town now for several decades.

Several jetties have been illegally constructed by the companies on the river bank and the unloading of ore into the barges is damaging the river. This is clear from the report of the Chief Secretary, Mr. Jaykrishnan, who visited the area in 1990.

Observations by TERI — In 1997, the Tata Energy Research Institute (TERI), in a comprehensive study report on mining, made the following observations regarding the dust pollution caused in Curchorem:

1. The towns of Sanguem, Curchorem and Sanvordem are densely populated areas and the population is exposed to high dust levels, due to ore transport and loading/unloading activities.
2. Apart from dust pollution, there is traffic congestion on the roads and accidents occur. Traffic often gets paralyzed.
3. Measures taken by the mining companies to suppress dust by spraying of water has only worsened the situation by making the roads slushy and slippery.
4. The maintenance of the roads is generally poor.
5. The major cause for dust generation is overloading and speeding of trucks. There is phenomenal ore spillage on the roads on this account. Due to this, dust generation is far in excess of standards prescribed by the Central Pollution Control Board.
6. Existing railway yard at Curchorem for handling Bellary ore is also a source of dust generation.
7. The report concludes this section with the observation: 'We agree with the Government of Goa's viewpoint that ideally the wagons from Bellary area should be taken to the port directly, since apart from the environmental consideration, it would also help in easing the pressure on roads as well as the river.'

The TERI Report also joined its predecessors and gathered dust on the shelves.

Writ Petition yields some results — Disgusted by the lack of improvement in the situation, four residents of Curchorem, along with the Goa Foundation, filed a comprehensive petition in the Bombay High Court on March 25, 1999, against the continuing mineral dust pollution in Curchorem. Giving details of the problem, the petitioners suggested a series of measures that could be taken to mitigate the problem. They also sought the implementation (within a time-bound period) of the recommendations of the expert committees set up by government, including those of the Dominic Fernandes House Committee Report and the TERI report.

On May 6, 1999, the Panjim Bench of the Bombay High Court (comprising Justices R.K. Batta and R.M.S. Khandeparkar) issued interim directions that all trucks coming out of the railway stacking yard at Curchorem



Dust pollution at railway yard

railway station would henceforth have to be properly covered with tarpaulin. The interim order also directed that the ore would be sprinkled with water before it was removed from the rail wagons to inhibit dust pollution.

As the truck owners treated the order nonchalantly, the Bench directed the police to seize all those trucks that were still transporting ore without tarpaulin and not to release them without getting the permission of the High Court. The following day, more than 20 trucks were impounded, many used by Sesa Goa which claims to be an ISO 14000 company. They were only released after their owners were brought before the Court.

On 6.9.1999, the High Court Branch, comprising Chief Justice Y.K. Sabharwal and R.K. Batta, directed the Chief Secretary to study the earlier expert committee reports and inform the High Court within three months about which aspects of these reports had been implemented, what remained to be done and the time-frame thereof, and on which aspects the Court's assistance was required. The Chief Secretary's Report showed that little was done; that much remained to be done. Even the order regarding sprinkling of water was not being properly implemented as barely one or two tankers were being used to keep the contents of 55 wagons wet.

The writ petition is still pending final hearing in the High Court.

However, as a result of the interim order of the High Court, mining operators in other parts of Goa also now have to cover their trucks with tarpaulin as the police are enforcing the specific rule in the Motor Vehicles Act that requires covering of all such vehicles.

As for Curchorem town, seeing that the dust pollution continued (despite the interim orders of the Court), the people finally decided that enough was enough. They came out on the streets, blocked the roads, refused to let the mining trucks ply and by bringing the town thus to a standstill, effectively prevented the ore from being transported through the residential areas of the town.

The Destruction of Agriculture

All over Goa in the mining belts, agriculture has been severely hit by mining activity. Many farmers, helpless to deal with the mining companies, have been compelled to switch over to non-farming activities for their livelihood. The damage to agriculture in the affected areas has also been irreversible.

Affected farmers have had no recourse but to approach the courts for relief from the depredations of the mining companies. Thus several PILs have been filed and the Court has taken these complaints quite seriously.

In two separate petitions, the High Court asked the Goa State Pollution Control Board (SPCB) to file reports on the damage to the Sonshi and Advai *nallahs* in Sattari taluka and to the Kushavati river in Quepem taluka due to storage of mining rejects on their banks. The SPCB reports reveal all.

Extracts from GSPCB Report on damage to Sonshi nallah

The length of the Sonshi *nallah* is about 14 kms. It is not a rain water drain but a long *nallah* which originates in the hillocks at a place near Vonvoliem village. It flows through villages Vonvoliem, Sonshi etc. before finally joining Harvalet river at the water falls. The first 5 kms. length of the *nallah* is passing through the area which is covered by the mining leases granted to various mining companies.

The area under mining leases comprises of two parts. The portion containing ore deposits is referred as 'mineralized area' and the remaining portion is referred as the 'non-mineralized area'. The non-mineralized portion of the lease is utilised for ancillary activities, such as dumping of the rejects. The mining companies have used the banks of Sonshi *nallah*, where the *nallah* is flowing through the non mineralized portion of the leases for dumping of their rejects ... Most of these dumps are more than 50 m in height ... It appears that protection of the *nallah* was not at all on the priorities of the mining companies at the time of the initial planning of mining activities. Most of the dumps, even though they are not

active at present, are not stable ... Repeated silting of the *nallah* during rains have altered the course of the *nallah*. Damage to the *nallah*, which used to be perennial, is almost irrevocable.

Both the clusters of horticultural gardens are depending on the Sonshi *nallah* for their water requirement. The mining activities on the banks of the *nallah* have affected the horticulture activities in two ways:

- a. Diminishing supply of irrigation water.
- b. Deposition of mining silt on cultivable land.

Mining activities near the *nallah* are about 40 years old. Prior to that, agriculture was the only source of livelihood for villagers. Since the mining activities are intensified, as an overall effect, hydrogeological conditions of the area are drastically changed. In the conflict between mining and agriculture, agriculture is pushed to a tight corner. The lessee of the mining lease, *vide* a special condition in the lease deed, gives an undertaking that he will rehabilitate the area after conclusion of the mining. However, situation at Sonshi gives an impression that rehabilitation of the agricultural areas lost in the conflict is a distant dream.

Extracts from GSPCB report on damage to Advai nallah

Advai *nallah* is a rivulet starting from village Ovalym and flowing via Advai to finally join river Madei ... The five mining companies operating in the catchment area of the *nallah* have set up their own sites for dumping of their mining rejects. All these dumping sites are located on both sides of the Advai *nallah*.

Due to increase in the intensity of mining activities during the last decade, huge quantities of the rejects are dumped at the five sites. Wash out from the dumps during heavy monsoons carries the eroded material into the Advai *nallah* ...

If a mining company wants to dump the rejects in a mined-out pit, they have to convince the Indian Bureau of Mines that further mining at the said pit is not viable ... The viability of mining is worked out ignoring the fact that extension of mining to

the agricultural ecosystem results into permanent damage of the local area. Also ignored is the expenditure incurred by the State Government to promote agriculture in a place like Advai.

Frequent silting and desilting of the *nallah* with mining rejects and the decline in productivity of the fields affected by the washout from the dumps will in due course of time make the agriculture in this area an unviable exercise.

... In passage of time erosion from the dumps will damage the agriculture to such an extent that the farmers will be compelled to distance themselves from their farms. Even after culmination of the mining, it will not be possible to restore their farms. As such the only remedial measure for protection of Advai *nallah* and thus safeguard the interests of agriculture is to restrict the mining activities into the mining areas. The dumps as they are at present require intensive programme of surface vegetation and active vigilance during monsoons.

Extracts from GSPCB report on damage to Kushavati river

The river Kushavati is one of the main sweet water rivers in South Goa. The area through which the river flows are mainly the agricultural areas.

... The problems are associated with the clumsy practice of processing manganese ore. At 3 spots on the right bank of the river, a substantial quantity of manganese ore was seen scattered as residual fines, marketable lumps or rejects. All sites were right inside the agricultural plantation.

Indiscriminate washing of manganese ore on the bank of the river leaves behind the residue which gets washed into the river during the washing process and also during the monsoon. No special machinery or plant is installed. The wash water emptied on ground is allowed to find its own way into the river.

The authorities should ensure that the washing operation will be carried out only at the mining sites. The operator of the manganese mine should not be allowed to operate unless he installs a washing plant at the mining site.

A Note on the Iron Ore Rejects in the State of Goa

During the Fifth Five Year Plan, the Indian Bureau of Mines (IBM) launched a programme to study mineral rejects in the country with a view to promote the conservation of the country's mineral resources.

The following kinds of iron ore rejects in Goan mines were identified:

1. Low grade lumpy ore
2. Low grade aluminous powdery ore
3. Low grade siliceous powdery ore
4. Low grade screen fines
5. Dressed rejects

The total iron ore produced and exported from the Union Territory of Goa, since 1947, is reported to be about 200 million tonnes. But the quantity of available rejects is only four million tonnes. This is because a large quantity of these rejects particularly the fine ore rejects, which are normally dumped on the slopes of high hillocks, have got washed off over the years (B. Vittal Rao, Indian Bureau of Mines).

Vittal Rao wrote his estimation out in 1982. By now another 260 million tonnes has been mined and exported. For every tonnes of ore mined, three tonnes of overburden materials, and other

rejects are generated.

The question worth asking is where have all these rejects and discarded materials gone? The answer: into the rivers and streams, and thereafter into the estuaries, where they have generated their own brand of ecological havoc, coating the river beds with a thick layer of toxic sediment, and choking the life out of an entire class of marine life that lives in that region of the earth.

Who will work out the whopping costs of such senseless damage to the Goan ecosystem? And who will bear the costs of restitution? Ask the mine owners when you meet them next.

TERI REPORT ON MINING

In 1997, the Tata Energy Research Institute (TERI) published an important study on mining in Goa. Titled 'Areawide environmental quality management plan (AEQM) for the mining belt of Goa', it aimed to give a detailed picture regarding the environmental and socio-economic situation in the mining belt of Goa and to suggest a detailed approach to be followed by the Government with respect to ecology, transportation, waste disposal and technology. The study was conducted in four clusters covering 57 villages.

With regard to the villages in and around which mining activity is carried out, the study observes, 'Villages in which mining activity has been going on point to a number of problems perceived to have been generated by mining activity and/or due to lack of attention by state and local governments. These relate to water shortages, dust related diseases, lack of transport and health facilities, unemployment and impacts on agricultural land.'

'Since the ore to overburden ratio in the mining belt of Goa ranges from 1:2.5 to 1:3, an enormous quantity of waste material is generated per tonne of ore mined. Since adequate land is not available for proper dumping, the dumps are typically steep and high (upto 50 metres). Due to paucity of dumping areas, in many mines dumping is often done outside the leasehold area. In addition to the waste material, there are many dumps containing mineral rejects from the mines. A large quantity of these rejects may be lost due to runoff over the years.'

With regard to forest areas, 'The total vegetative cover lost is to the tune of 2528 ha. between 1988 and 1997 though this may not be all due to mining operations.'

'The impact of mining on agriculture is observed in (a) the change in the area under cultivation around the mining areas and (b) loss in productivity of crop land due to siltation from mine waste and reduced availability of irrigation water due to the siltation of irrigation channels.'

With respect to air quality, 'In many villages Suspended Particulate Matter (SPM) levels exceed the permissible standards for residential and rural areas. The SPM concentration levels in almost all the mines exceed the CPCB standards for industrial areas. The respirable size fraction in ambient air and free silica content in respirable dust is higher than the guidelines by the Directorate General of Mine Safety... The large quantity of ore transported on mine and public roads has been identified as one of the major sources of dust pollution and is resulting in deterioration of ambient air quality in many villages.'

'Mining affects the hydrological regime and water quality of rivers by direct discharge of mine water to the streams and due to erosion and wash-off from the mined out area and waste dumps. The factors contributing to pollution of water bodies are discharge of mine pit water, wastewater from the wet beneficiation plants, rainwater runoff from the dumps, barge movement and effluent from workshops.'

'There are a number of mines which are working below the water table and this has led to a continuous

dewatering of these ore bodies. It is good quality potable water and if harnessed properly can meet the demands of surrounding villages. The present practice is that the mine water is simply pumped out and allowed to follow the natural topography... Mining impacts on surface as well as groundwater regimes are significant.'

After this damning indictment, the report goes on to make various recommendations, some of which are summarised below:

- i. Implementation of abatement measures in the operating leases/mines should be the responsibility of the mining companies.
- ii. Rehabilitation of abandoned pits and dumps and desilting of streams and *nallahs* due to past mining activity should be the responsibility of the government.
- iii. The improvement of mine roads and public roads should be taken up by the government. The cost can be recovered from the companies in the form of a road cess.
- iv. Merger of adjacent mining leases for more efficient operation.
- v. Further studies of various kinds are recommended.

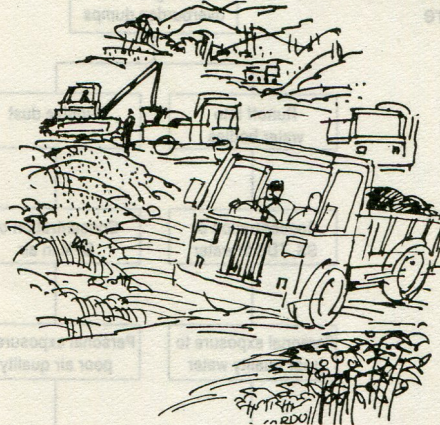
The TERI study has done valuable work in suggesting various management strategies for controlling environmental pollution and rehabilitating old mining sites. It has also suggested that the costs should largely be recovered from the industry and some should be borne by the Government. Management Strategies (MS) to tackle sets of problems are suggested. The costs involved in implementing these strategies are also estimated:

MS-1: Rs 7 per tonne of ore production

MS-2: Rs 11 per tonne of ore production

MS-3: Rs 5 per tonne of ore production

These costs are not prohibitive—the only thing that seems to be preventing the mining industry from taking up ameliorative measures is their experience that they can continue to get away with current practices in the absence of a strong political will to make them pay for the environmental costs of their operations.



Mining and Mayem Lake

The mining activity of the Dhempo Mining Corporation in Bicholim has been posing a serious enough threat to one of the major tourist attractions of Goa, the Mayem Lake, which is visited annually by thousands of persons, and to the Idgah (a notified protected monument). As a result of the mining lease, access to the Idgah is also being restricted by the company, and the authorities are turning a blind eye to the impact of the mining activities on the monument itself, which is being disfigured by dust pollution.

The mining site is within a kilometre of Mayem Lake, within a few hundred metres from the Idgah and within 500 metres of Bicholim town. The Supreme Court passed a detailed judgement dated 10.5.96 banning mining activities within a radius of 2 kilometres of Badkal and Surajkund Lakes on grounds of protecting the environment of such lakes. The situation with regard to the Mayem lake bears many similarities to this. The tourist activities associated with Mayem Lake can be carried out sustainably in perpetuity. This is not so with the mining site in question, which will be rendered a desert once the mining is completed in a few months or years.

The Mayem Lake has also been developed for purposes of irrigation many centuries ago and for purposes of tourism since 1965, and large amounts of public monies have been expended in its development. Approximately 65 houses depend upon the waters of the lake for irrigation purposes. However, due to the mining activity at

the site, the water levels in the lake have appreciably declined. Mining silt has been accumulating in the lake from the mining dumps that have been kept unprotected and unstabilised on the mining lease.

A study by Dr. G.N. Nayak of the Goa University has specifically focused on the impact of mining-related activities on the lake. Writes Nayak:

'Though there is no actual mining activity within the catchment area of Mayem lake, mining rejects are being dumped within the mining area. They can be classified as stabilized old dumps and fresh new dumps.' The study has found that retaining walls constructed around the dumps are generally ineffective in holding specially fine silt sized material, and the erosion and transportation of material from the dumps to the lake basin cannot be ruled out, especially during the monsoon months. The chemical analysis of samples from the lake supports this view.

Dr. Nayak has made detailed recommendations regarding how the problem can be contained: 'Engineering structures should be constructed around all the mine dumps within the catchment area. Masonry walls with filter beds should be constructed. This consists of two *pucca* walls parallel at a distance of five metres with intervening space filled with sand and pebbles, to arrest fine particles of solid flowing into the fields as well as the streams. The intervening space has to be periodically removed and recharged with fresh media.'

In fact, it would be helpful if these measures could be taken at all mining dump sites as this study has shown that many other water bodies in Bicholim are also affected.

Dr Nayak's study goes on to warn of the dangers of uncontrolled mining. As a result of open-cast type of mining, large voluminous amounts of mine rejects (dumps) have been created around the mine sites which not only change the topography but cause serious environmental problems if not maintained properly. These mine rejects (dumps) vary from unconsolidated loose rubble to silt sized sediment fractions. As a result during monsoons, due to steep slopes of dumps and unconsolidated nature of their constituents, dump material gets washed down the slope either filling up the low-lying agricultural land or it gets deposited within inland water basins causing siltation and transforming it to uncultivable land. It may even get itself directly poured into the estuary or river system if situated alongside, thus creating ecological and/or environmental problems.

The protection of Mayem lake is vital as it is important for agriculture, tourism and human consumption. Using Nayak's research, the Goa Foundation filed a PIL in the High Court to protect the lake. The petition is pending final hearing.

Diagram showing the Environmental and Public Health Impacts of Mining Activities

Driving force

Indirect Pressure

Direct Pressure

State

Exposure

Effects

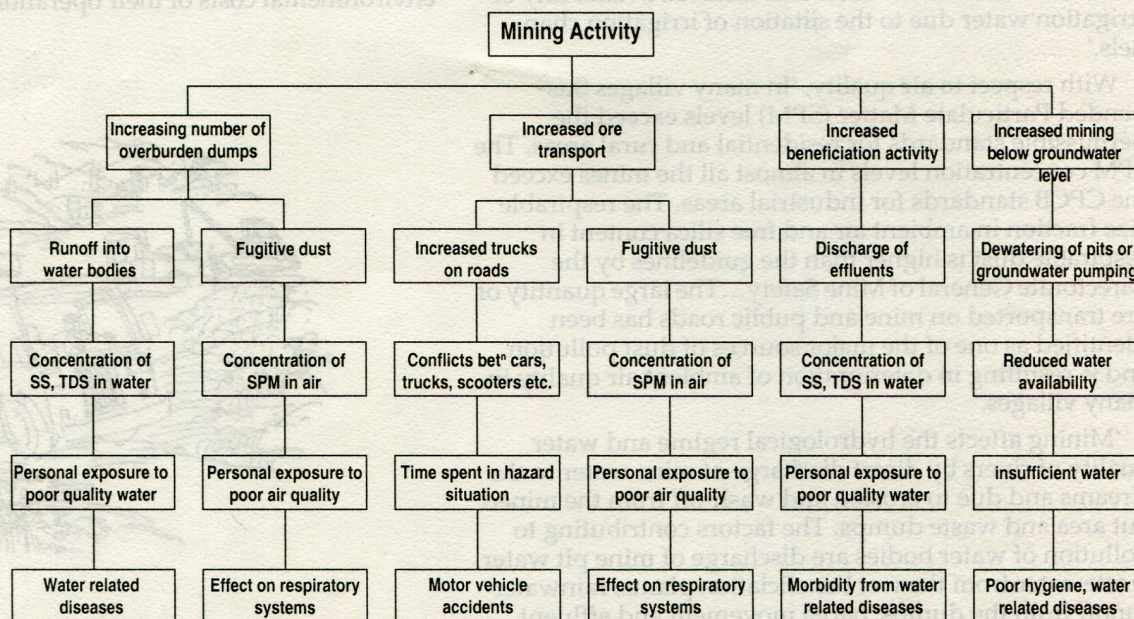


Diagram taken from *The State of Goa's Health (Sangath)*

Public Hearing on New Mining Leases

In 1994, the Ministry of Environment issued the environment impact assessment notification requiring prior environment clearance for various activities. Mining was listed as Item No.20 in Schedule 1 of the Notification. The Ministry on 10.4.1997 issued a further notification making public hearings mandatory for projects listed in Schedule 1 prior to the issue of environment clearance.

In Goa, the first mining lease covered by the notification was a lease owned by Goa Investment Pvt. Ltd. (GIPL) located at Pissurlem, Sattari, Goa. The Goa Pollution Control Board constituted an expert panel for the hearing on 1.9.98 and fixed a public hearing for the 15th of October 1998 in the District Collector's office. It is interesting to see how the then Member Secretary of the State Pollution Control Board was able to manipulate the proceedings of the Public Hearing Panel so that he could eventually send a report recommending environmental clearance to the Ministry of Environment.

On the day of the hearing itself, a large number of villagers assembled in the Collector's office. When the hearings began, all those who assembled from the village of Pissurlem and staff of the Goa Foundation made a very strong representation against the grant of the lease. The Panchayat of Pissurlem also filed a detailed written statement objecting to the lease. So did the Pissurlem Nagrik Farmers' Committee. They filed objections on the grounds that the lease would affect

their environment and that their paddy fields would be destroyed, as they have been in other mining areas. Not a single person during the public hearing supported the grant of environmental clearance for the lease. The Panchayat indicated to the panel that several survey numbers covered by the lease were either forested or comprised paddy fields. About 300 families of all wards in the village cultivated these paddy fields, despite having to remove every year the deposits of mining rejects originating from adjoining mining leases.

Due to the current mining operations of Damodar Mangalji & Co, (a sister company of GIPL) the water table in the village of Pissurlem had gone down considerably. Hence the new lease would have even more serious consequences. The farmers were fairly certain that the mining activities would lead to eventual submergence of their fields under mining activities. The farmers drew the attention of the panel to a lake on the lease land which supplied irrigation water to the wells and for agriculture in the village. The representation noted that in order to preserve Pissurlem's paddy fields from the negative effects of mining companies in the neighbourhood, the Government of Goa had in fact sanctioned a 2 crore irrigation scheme in 1995 to bring water from the Madei, and that the 3 companies already operating in the area had agreed to pay 25% of the total project costs.

At the end of the hearing, the Collector was

clearly impressed by the opposition. He remarked that it would not be able to go ahead with the sanction of the lease due to the huge public protest against the grant of sanction. The Goa Foundation came to know, however, that a few days prior to the public hearing, a large number of letters supporting the lease, prepared neatly on computers and allegedly signed by people from Sattari generally had been entered in the records of the Pollution Control Board, ostensibly to balance expected opposition from villagers who feared being hurt by the mining operations.

Interestingly not a single one of the signatories of these leases turned up for the hearing. However, their presence in the file was used by the Member Secretary to complete his report by claiming that there were sufficient people to support the project and to send the file for expediting environmental clearance for the project. Panel members later expressed shock that such a report had indeed been sent to the Ministry without their knowledge and rejected the idea that a subsequent meeting had been held to discuss the panel's report.

Based on the manipulated documents submitted by the Pollution Control Board, the Ministry of Environment eventually granted environment clearance to GIPL under the provisions of the Environment Protection, Act. This is the manner in which statutory authorities undermine provisions of law in order to support and legitimize environmentally destructive acts in the State.

Mining Dust and Health

Problems and illegalities galore — Dust is a problem all along the road where the ore and rejection-carrying trucks ply. The highest heavy vehicular traffic has been observed at Ambegal in Pale village, near Pale-Cotombi panchayat office where trucks of many mines crisscross each other.

In many areas where the heavy trucks ply, water spraying of the roads is done at regular intervals by the companies' water tankers in order to keep the dust in the air at a minimum. However, constant spraying of water affects the asphalted road, as asphalt loses its properties and deteriorates. These roads have also not been designed for heavy axle load. Due to the above combination of factors, the roads in the mining areas are in bad shape with either large potholes or a pockmarked surface.

Very many of these trucks belong to the local people of the village, who, also in their greed for money, care very little whether the overloaded trucks spill on the roads. The trucks are given to private parties under hypothecation to the companies. Thereby the mining companies keep their

own infrastructure low and also reduce their liability for maintaining a large number of trucks and an equally large trucking force.

The figures on respiratory illnesses as recorded at the local Primary Health Centre paint a telling picture of the kind of health problems the people are facing (see *PHC table*).

PHC Curchorem 1997-98

Upper Respiratory Tract Infection	8796
Common Cold	7344
Bronchitis	6639
Asthma	7549
Sinusitis	2345
TB cases under treatment	426

SESA GOA

As far back as the late fifties, Sesa Goa came alive to the ugliness of the iron ore dumps and the threat they posed to the ecology in terms of siltation and erosion.

Under the guidance of Senor Smoelling, its then Managing Director, it decided to rehabilitate the dumps and began planting cashew trees on them (vegetation being considered the only viable solution). The first dumps to be thus treated were at the company's Orasso Dongor mine in Advalpale in Bicholim. Between 1960 and 1981, Sesa Goa extended the practice to all its other reject dumps and abandoned pits, introducing eucalyptus besides cashew.

From 1983 onwards, the company became more systematic in its efforts. A professional horticulturist and landscape specialist named Victor Castellino was brought in. He surveyed the sites and developed a comprehensive plan for the rehabilitation of over 4,00,000 square metres spread out over Orasso Dongor, Sanquelim, Sonshi and Codli. The Plan is now being executed in a phased manner. 15,000 saplings were planted during the 1983 monsoon and another 15,000 the following year. Over the next five years Sesa Goa Limited planted another 40,000 saplings on these four lakh square metres.

At Orasso Dongor the total leased area is 99.4 ha of which 43 ha is presently occupied by mine waste dumps of which 41 ha is under cashew. Plantation commenced in the late fifties and till 1986 approximately 29,679 saplings had been planted. 5000 cashew trees are already yielding fruits.

The activity has stabilized several dumps successfully.

At Codli, leased area available is 299.58 ha of which 30 ha are under mine waste dumps. 10,160 saplings were planted in 1987 and 2950 in 1988. At Sonshi, where the dumps are also still active, an area of 10 ha has been revegetated. About 15,315 saplings were planted upto 1986.

In order to meet its own annual targetted demand for saplings, the company started its own centralised nursery

Sesa Goa's ecologically restored mining site at Sanquelim



at its Sanquelim mine where it raised saplings of local species for supply to all its mines in Goa.

(So far only two companies have their own nurseries: Sesa Goa Limited at its Sanquelim mine and Chowgule Company Private Limited at its Pale Dongor mine. Only three companies have Environmental Officers on their staff: Sesa Goa, Chowgule and V.M. Salgaocar. All the mining companies depend mainly on the Forest Department's nurseries for saplings. Sesa Goa in addition has recently employed a microbiologist and started a microbiological laboratory at its Codli mine site.)

The Sesa Goa land rehabilitation plan is designed to ensure that the resurgent vegetation is mixed—the saplings vary from the native tamarind, jackfruit, mango and bhendi to the more exotic bougainvillea, cossin siamia and glyricidia. The resulting mixtures may not be the same in composition as the original forests that were destroyed to allow mining, but they are certainly better than monoculture plantations.

'So how do they do it and how much does it cost?' other mining companies might ask—if they care at all, that is. 'Quite simply, very cheap and with the prospect of good returns,' seems to be the plain answer. And, of course, there is the additional reward of a clearer conscience to boot!

To costs first, for the sake of our penny-pinching mining magnates and our more 'pragmatic' (read 'doubting') readers. Having planted nearly 30,000 saplings over two years, Sesa estimates that it works out to a tiny Rs 2 per sapling—and this covers costs of saplings, labour and manure. That means an investment of a mere Rs 30,000 a year, which, in terms of any mining company's profits, is peanuts.

Besides, this investment is not entirely without prospect of returns. Most of the land on which rejects are dumped is owned by the companies, or is on long-term leases. The cashew, mango and other horticultural trees can yield substantial income—as can the others, from firewood and timber! Says one insider who has worked out the economics: 'At the very worst, it is a self-regenerating proposition.'

Each monsoon its officers start with what's most dead: the 'dead dumps' (which will take no more rejects) and 'dead pits' (which can yield no more ore). Since clay rejects do not support vegetation, the engineers ensure that laterite rejects are used to cover all dead dumps. Then, having procured the quota of saplings for the year, the man in charge recruits teams of casual labour and in a couple of weeks completes the season's planting. Twice thereafter, during the monsoon, the saplings are manured. The rest is left to nature, which so far has done her job fairly well under the difficult circumstances.

The other major problem is the open-cast pits.

These collect huge quantities of water. Since the water quality is acidic, it does not support fish life. Experiments are underway to alter the pH of the water so that it can support fish life and also be used for irrigation. Afforestation is being done on the sides of the pits.

Mineral Foundation of Goa

The mining industry in Goa has set up the Mineral Foundation of Goa (MFG) to address the environmental and social issues concerning the community residing in the mining belt of Goa. The background work for setting up the organisation was done by TERI. It has a number of social and environmental objectives. These include 'to assist in future mining to be conducted in an environmentally responsible manner for development of the mining region of Goa and its consequent liaison with Central and State Government authorities.' The MFG will also 'channelise the efforts underway and to pool together activities to improve the environment.'

The activities of the MFG commenced in June 2001. Since its inception, the MFG has taken up projects concerning social and environmental issues.

On the environmental front, the MFG does not take up any work which is part of the legal responsibility of any of the mining companies which have promoted the organisation. This is so as to prevent the MFG getting bogged down in performing the statutory environmental functions for the mining companies.

Desilting of the Harvalem Waterfall: The river feeding the Harvalem Waterfall is made up of three *nallahs*, viz. Pissurlem, Sonshi and Upper Harvalem *Nallah*. The Harvalem Waterfall is a place of scenic beauty with a Temple of Dev Rudreshwar and is marked on the tourist map of Goa. The festival of Mahashivratri is celebrated with great zeal and around 25,000 devotees visit the temple on this day to take a holy bath in the pool at the waterfall. The MFG took up the task of desilting of the base of the waterfall.

The wall of the temple hall facing the pond had collapsed and needed immediate attention. A counterfort type RCC wall is now built to strengthen the *sabhamandap*.

The MFG has also constructed retaining walls to protect the sides of the waterfall pond and landscaped the area to give the surroundings a beautiful look. The project was recently completed.

As the MFG took up the job of desilting of the Harvalem Waterfall, it became imperative to desilt the drainage system on the upstream side, so as to prevent recurrence of siltation at the waterfall. In view of this, the MFG arranged to carry out detailed survey of the river drainage system comprising of Pissurlem and Sonshi *nallah*. The volume of siltation was assessed and GMOEA in association with the concerned mining companies has taken the decision of desilting the *nallahs* upstream of Supachi Pud where the above *nallahs* meet. Desilting of the stream downstream of Supachi Pud till the top of the waterfall is the job of the MFG.

Restoration of Fertility of Silted Fields: It is observed that the fields adjoining the *nallahs*, especially under paddy cultivation, have been silted. The silt in such fields has mixed with the original



Cleanup of mining sediments in Harvalem water fall area by Mineral Foundation of Goa

soil due to ploughing or the layer is too thin for manual desiltation. The fields have been rendered unproductive over the years or have been abandoned. Therefore it was felt that the MFG could associate with NEERI and explore the possibility of restoring the fertility of such fields through the use of Integrated Biotechnological Approach. Accordingly the scientists from NEERI were contacted who showed their willingness to take up the project.

The Asst. Director, Environmental Biotechnology Division, along with a team of scientists visited Goa and the fields for carrying out the project were identified in consultation with the Zonal Agriculture Officer from the Department of Agriculture, Government of Goa. Samples were drawn from these fields as per the directions of the scientists and were dispatched to NEERI.

NEERI has conducted initial tests on the samples and sent a project proposal giving the details of work plan. The Board has approved the project and it is hoped MFG will complete this project successfully too.

Responsible Management Practices: The impact of mining activity on the environment has attracted a great attention of the industry. Companies in their respective areas have taken certain steps and conducted certain tests to develop technologies to minimize the impact on the environment. However, these practices are mainly confined to the respective mines. The MFG felt that the activities initiated and technologies incorporated by some of the companies should be disseminated to other companies. In view of this, the MFG contacted some companies to share their expertise with the mining industry of Goa. The companies included Aspinwall Geotech Ltd., Maccaferri Environmental Solutions Ltd., National Environmental Engineering Research Institute, and Australian Minerals & Energy Environment

Foundation (AMEEF), which is actively involved coordinating and disseminating technologies towards minimizing the impact of mining on the environment.

AMEEF has published a paper on Vetiver grass, which has been successfully used to stabilize mining waste dump and unstable slopes. This species is native of Indian subcontinent and was introduced to Australia via Fiji in early 1900s. Vetiver grass has high tolerance to adverse conditions and is long lived. It has a thick root system and stiff and erect stem, which form dense hedges and can reduce flow velocity and traps sediments. Being of Indian origin it is proposed that these unique properties of Vetiver can be utilized in the Goan scenario by planting the grass between the series of toe walls below the waste dumps to trap washed off sediment. A similar attempt is being made by a mining company in Goa with the use of Congo grass.

A Mineowner Reflects

From the stockpile at Pit No 6 at Pale Mines belonging to M/s Rajaram N S Bandekar & Sons, the iron ore rejects flow into the river Madei which is a major route for barges ferrying iron ore. During the monsoon, huge quantities of rejects flow down from both active and dead reject dumps to the river bed causing considerable silting downstream which affects the required draught standards for barge navigation and causes hindrance at jetties. While this by itself is a harmful consequence of the mining industry, such heavy silting will affect the course of the river and result in the flooding of the adjacent fields.

I am most seriously concerned that the indiscriminate flow of mining rejects will render the river totally useless for navigation which will affect the mining industry in no small measure. Before the river route is totally choked, it is imperative that preventive measures should be taken. Fortunately for us, this year the rainfall had been much less than normal, otherwise given the usual quota of rain during the monsoon in Goa, the flow of rejects would have been even more heavy. Apart from this, the sand on the river bed which is authoritatively admitted to be invaluable for construction purposes, will also be rendered useless because of the mixing of the rejects. It would be a pity if such an important source of construction material is thus ruined.

Further, the waste tailings from the Ore Processing Plants including that of M/s Sociedade de

Fomento Industrial Private Limited at Maina (Bicholim) are being continuously dumped directly into the river. That we have to operate our barges only at high tide and that the ore loading jetties need to be desilted are clear indications of the fact that the silting on the river bed is affecting the draught required.

In view of the importance of the iron ore export trade to Goa's economy, I feel it is the responsibility of the government to see that the river navigation is not affected under any circumstances and to take every step necessary in order to maintain the navigability of the inland waterways. If river navigation is affected, the export performance will naturally be affected, which in turn will build up pressures on the economy and social welfare of the people of Goa. One does not know why government has turned a Nelson's eye to this problem in spite of my drawing their attention to it repeatedly ever since 1980. Since the mining industry earns it substantial revenue, including the charges levied for inland waterways, the government should have given priority to this matter and taken appropriate steps to eliminate the problem.

To begin with, I feel, erring mine owners should be asked to clear up their reject dumps such as the one cited above so that the rejects do not continue to flow into the river. Secondly, desilting of the river bed should be taken up so that barge movement is not hampered.

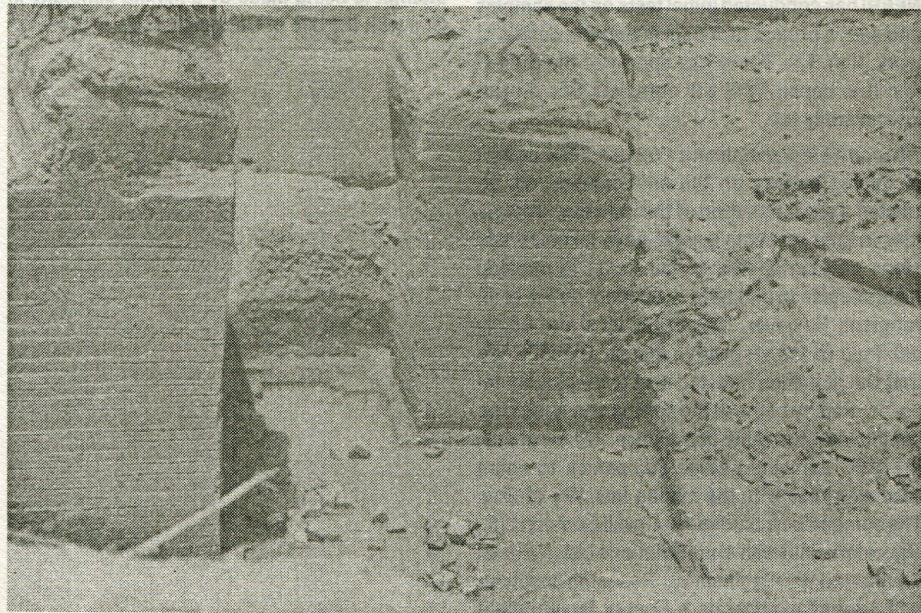
I would like to refer to yet another related area, where acts of negligence or selfishness on the part of a few mine operators are also seen to hurt the industry. Under the Portuguese ex-colonial Mining Laws, the area of a mining concession was limited to 100 hectares. It is often the case in Goa, that a part of the ore body is located in one concession and the other part in adjacent concessions. Hence under the Safe Mining Rules, the depth to which one can go, is dictated by the area for lateral extension. Some of these mines, although they have ore deposits below, have been stopped as they have already reached their boundary limits or mining is uneconomical due to costs involved in dewatering the mine. Some of these waterlogged pits have become a nuisance to the adjacent working mines due to heavy seepage of water. Considering the fact that iron ore reserves are national resources, the mine operators should not play truant in leaving behind small ore patches at the boundaries and unexhausted pits so that refilling or reclamation of these pits can be taken up by using rejects, as areas for dumping rejects are a major constraint in the limited size of Goa. Examples are: Timblo's mine at Cudnem, Sallitho's mine at Pale. Concerned authorities should ensure that the mine operators exhaust the pits and take up suitable rehabilitation measures giving emphasis on proper post mining land use and landscaping.

V.M. Salgaocar

Stone Quarries

The Tata Energy Research Institute has done a study on laterite stone quarrying in Goa (No.97/WR/51/1998). The 74-page study is the first of its kind on a little known aspect of mining in the State as the study involving the extraction of laterite bricks for the construction of Goan homes.

Abandoned stone quarries at Molem



As the whole of Goa is practically sitting on laterite, it makes good sense to utilise this material for the construction of houses and the laterite quarrying activity has gone on for several centuries for this reason. In recent times, however, due to enhanced demand, several more quarries have

come up legally and illegally and at the present moment not a single Government department is either aware of the spread of the industry or its impact on the environment.

There are a whole lot of environmental laws which in theory regulate mining activity of any kind. When one considers that few of these laws are implemented with regard to large-scale mining in the State, it would be futile for them to be implemented in the case of smaller operations like stone and metal quarries. The authorities do not believe that they have any role in the matter.

The TERI Report has indicated the following environmental impacts:

1. Land set aside for orchard or agriculture is now used for quarrying.
2. In several large quarries, stone waste stacks have been kept in the open environment and the operator of the quarry has moved elsewhere.
3. There is no rehabilitation of quarry sites. These are waterlogged and hazardous during the monsoons and become mosquito breeding sites.
4. Environmental management measures such as back filling, revegetation, proper stacking of overburden are nowhere to be found.

We hope the Department of Industries & Mines is listening.

Tailpiece: The Upheaval

The advent of mining in Goa impacted agriculture adversely. Before the environmental impact came the process of luring away agriculturists from their traditional occupations. This led to considerable disruption. This extract from the Konkani novel, *'Acchev' (The Upheaval)* by Pundalik Naik poignantly brings out the conflicts that arose as a traditional way of life was abandoned for an uncertain future. The novel is now available in English translation from Oxford University Press, and can be obtained from Other India Bookstore.



Pandhari peered at the indistinct figure, recognising the voice at once. It was Babuso, who lived across the river. 'Come in, come on in' he called out. 'And just one box of liquor? Even a crate will be too little for you and that bottomless pit that is your stomach! How do you ever digest so much liquor?'

'If someone gives me poison free of cost, I'll even digest that,' Babuso replied, still standing in the shadows.

'What's the matter, no fairs or festivals to keep you occupied? And how are you here and not at some gambling den playing cards?' Pandhari held the lantern out to guide Babuso up the steps when he suddenly noticed the other man standing beside him.

'Who's there?' he asked, surprised.

'Come Babuji, come up to the porch,' Babuso guided the stranger, dressed all in white, up the steps.

Pandhari quickly spread a reed mat on the floor and invited the stranger to sit down. He peered at him closely, noting his smooth plump cheeks, his glossy black moustache and the hair combed straight back from the brow. The scent of his hair oil hung heavily on the air as he sat there in his white dhoti and the pair of thick-soled sandals that adorned his feet. Pandhari thought at once of the snow-white cranes that sat on the embankment in the field turning their heads this way and that, just like the stranger was doing. Seated beside him in his shabby worn-out clothes, Babuso resembled nothing more than a crow perched beside a crane.

'This is Prasad *babu* ... he's Gujarati ...' Babuso said to Pandhari as the man nodded solemnly in agreement.

'The same man who's having those pits dug in Navelim, to cut up those stones?'

'Stones?' Babuso exclaimed. 'They're not just any type of stones ... they say they make gold out of them. And that pit is called a mine. There's lots of work up there. Money, too. You sit here doing nothing for six months after sowing your field. It's possible that you won't get a good crop. Even if you do, it's yours only provided the cows and other animals don't get to it first.'

Babuso darted a glance at the Gujarati but the man obviously hadn't understood a word. He muttered something in his own language and

gestured to Babuso to go on, staring expectantly at Pandhari's face all the while.

'Where do they take those stones?' Pandhari was curious.

'To make gold, I told you. But let them take it to the cremation ground, what do we care? So long as we get five rupees a day ...'

'Five rupees a day!' Pandhari was incredulous.

'Ask him,' Babuso pointed to the stranger who nodded vigorously yet again.

'Five rupees is what they get up at the mine for breaking up the stones. Not by hand ... the Company provides explosives. Remember how we used gelatine (gelignite) to blast those huge rocks by the Lake?' Babuso came and squatted beside Pandhari lowering his voice to a conspiratorial whisper. 'If you have a bullock cart it's easy to make money. Just bring the stone chips down from the mine, they'll weigh the cart and they'll pay. Bring more, earn more.'

'Where do you take the stone?'

'From Navelim down to the river at Shenori. Then they'll load them in big boats and take them away.'

'But the bullocks will have a hard time hauling such a load,' Pandhari was hesitant.

'Now look here Pandhari, you can't get anything easily in life. And since the work is tough they'll pay you well ...'

'Yes ... yes. Almost seventy.'

'Wait.' Babuso waved the man to silence. 'Pandhari, if I hire your cart to bring a load down from Navelim to Shenori what will you charge? Fifteen rupees? Twenty? Thirty?'

'Thirty rupees! Are you mad? Who'll pay thirty? I brought a load down just the day before yesterday. Got ten rupees. Nothing more.'

'There! Do you see? Work for the mine and you'll get seventy rupees for each trip. Three twenties and a ten.'

'What do you mean? Who'll pay that much?' Pandhari was incredulous still.

'He'll pay. He's sitting right here ... well, *Babuji*?'

'Yes ... yes. Why not? Work ... you'll get paid.'

'So that's settled then. Take your cart to Navelim tomorrow morning. Don't waste time.' Babuso rose to his feet but Pandhari remained sprawled on the ground immersed in his own thoughts. Rukmini and the children clustered in the door-

way, staring at him, but he paid no attention to them.

'Don't worry so much,' Babuso sidled up to Pandhari yet again and whispered into his ear. 'Take the cart to Navelim tomorrow. You needn't go the next two days. But go tomorrow or he might hire someone else.' Then turning to the Gujarati gentlemen he said 'Come on *Babuji* ... let's go. It's all fixed.'

The man rose to his feet but made no move to leave. His eyes, like Rukmini's, were transfixed on Pandhari's inscrutable face.

'Come in here ... one moment ...' Rukmini called out to him. Pandhari could sense the resentment that hung heavy in those words but he was in no mood to listen.

'Tomorrow, then,' he said.

'Good! Very good!' Babuso and the other man were delighted. They clambered down from the porch and were soon lost in the darkness.

'Has the Spirit of the Lake turned your head?' Rukmini spluttered, her words coming out in torrents.

'You don't understand.'

'What? That tomorrow is the day fixed for the sowing?' her bloodshot eyes spat fire in the darkness.

'What's the matter, Avai?'

'Don't we sow tomorrow?' the children clustered around their mother.

'Ask him.'

'Don't we sow tomorrow, Bappa?' Kesar turned to her father in alarm.

'Not tomorrow. The day after.'

'Why? Let the fields be damned. You won't get five rupees a day for working in the fields.'

'Keep quiet, will you?'

'Why? Because my husband has lighted a lamp ... with which he's soon going to burn this house down? Because he's forsaken his gods and his duties? Is that why?'

'Keep quiet Avai ...' the children began to sob.

'Stop screaming. The neighbours don't have to hear everything.'

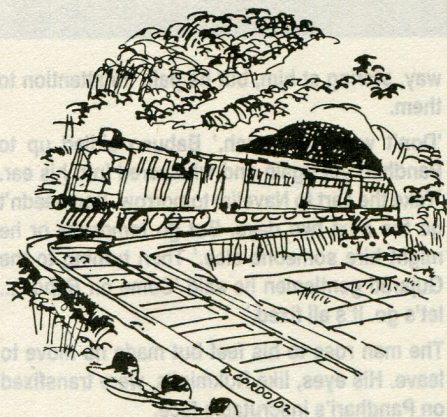
'Let them ...'

'Keep quiet or else ...! Now go and sprinkle cowdung water on the sprouts and put them away.'

'I'll boil them instead ... make a bitter broth ...'

'What!' Pandhari struck her just once but the blow sent her reeling against the wall, stunned. And the whole hut seemed to shake with the impact.

*From the novel 'Acchev' by Pundalik Naik
Translated by Vidya Pai*



Goa has suffered immensely from the scourge of large infrastructure projects. Ostensibly created to bring development to the people of Goa, many of these projects have been palpably unsound and only brought misery to the residents of this small State. The rationale underlying most of these projects seems to have been to provide opportunities for loot for our corrupt politicians and bureaucrats, rather than benefits to the people at large. Ranging from railway projects that create irreparable damage to the environment, irrigation projects that displace thousands and bring only dubious benefits, to a nuclear disaster cooking at the very doorstep of this state, infrastructure projects have



Konkan Railway bridge over Tikhazan, Mayem

Infrastructure Projects

proved to be an unmitigated disaster—small wonder then, that development has acquired a bad name in Goa. Nothing illustrates this better than the construction of the Konkan Railway.

Subsequently, more and more outrageous, large-scale developments have been proposed, including a new international airport at Mopa, an outer harbour, a gas pipeline from Goa to Hyderabad and many more.

None of these developments is expected to allow Goa to survive as we know it. In the words of the old Beatles song: Hello, Goodbye—hello to development, bye, bye to Goa. Is there any other construction one can place on what is unfolding before us?

THE KONKAN RAILWAY

Hailed as a technological marvel and various other hyped-up descriptions churned out by Konkan Railway Corporation's (KRC) well-oiled PR machine and lapped up unquestioningly by the media, the Konkan Railway project is a prime example of how an opportunistic, decadent and fractured polity—coupled with an irresponsible and callous bureaucracy—can wreak ecological havoc of monstrous proportions. To add insult to injury, all this has been done in the name of creating a railway system for the western seaboard, a long-standing demand of the people of the area and in itself a laudable objective.

Initially, there was general support for the Konkan Railway project—until the route alignment was announced.

It was obvious from the proposed route alignment that a project that had been meant to act as a catalyst for the development of the hinterland would end up completely neglecting this backward area and going through the overdeveloped and fragile Goan coast, including the area hosting the *khazan* network.

The tremendous opposition which this route alignment aroused in Goa forced the authorities to make some token changes in it after going through the usual rigmarole of public hearings and enquiry commissions. But the vital issue of environmental destruction, which was the basis of opposition, remained untouched by such cosmetic changes.

Today the Konkan Railway is a reality. That it has brought in certain benefits in terms of passenger traffic is not in dispute. But all this could have achieved without its attendant environmental havoc if only sane voices proposing changes in the alignment had been heeded. Goans today are left with devastated *khazan* lands, hills razed to the ground or collapsing, disturbed mangrove

areas and choked paddy fields. Naturally, Goans are sceptical about any development that has come at such a high cost.

What is known about the goings-on of the prestigious project is only the tip of the iceberg.

On 26th January 1998, Republic Day no less, a full four years behind schedule, the Konkan Railway (KR) had its first complete run from Mumbai to Mangalore. It was dedicated to the nation on May 1st the same year by no less a person than the Prime Minister, Atal Bihari Vajpayee. The KR was 'commissioned' even though the Commissioner of Railway Safety (CORS) at the time was not at all happy with the safety conditions in which the railway was going to be run.

When a new railroad is commissioned by the CORS, it is used for goods traffic only. After 3-6 months, the CORS rechecks the track for stability and safety. Only then does he commission the railroad for passenger traffic.

Surprisingly, on the KR, the CORS put the cart before the horse. KRC was allowed to first run passenger trains,

Culvert submerged under weight of high embankment in Tikhazan



but not the heavier goods trains. This was because the railroad was considered unsafe for such heavy traffic. Other unsafe conditions connected with the track are enumerated below:

1. Mandatory guard rails were not used on bridges, RUBs, viaducts, in tunnels, at level crossings and below ROB.

2. Embankments had been sinking for several years and were still sinking. The KRC's ridiculous response was to pour more ballast on the tracks. At Cortalim and Mayem-Tikhazen in Goa workers were permanently posted to do 'running repairs' on the embankments. What sort of a railway was this?

3. Landslides and rockfalls in cuttings are a regular feature, particularly during the monsoon.

4. Tunnels keep on losing chunks of material due to water logging and vibrations of passing trains. At Pernem tunnel in Goa there is permanent staff to monitor the safety of the tunnel before letting a train through.

5. Trains have derailed due to stones being washed down onto the tracks. Fortunately, these derailments took place at slow speeds near stations.

6. In the first five months, eight people died on the exposed tracks in Goa alone, hit by trains. The KR track is supposed to be fenced in accordance with CORS requirements.

Even while the railway was being commissioned, it was far from complete:

1. The three major railway yards in Goa at Margao, Verna and Old Goa were not even 10 percent complete.

2. Work on stations and buildings was far from complete.

3. The KRC still did not own any rolling stock, viz. coaches, wagons, locomotives, shunters, cranes, mobile facilities, etc. These were borrowed from other zonal railways and were usually worn out, dirty and heavily depreciated.

5. The KRC also had huge unpaid dues with contractors and suppliers. For example, they owed Rs 100 crore to Rani Constructions alone—one of their biggest contractors in Goa.

KRC, further, had not yet finished paying for the land acquired for the track and related facilities. At present, there are over 1500 cases filed against the Corporation for higher land compensation in various courts. In some

areas, the KRC has paid farmers less than Rs 0.80 (eighty paise) per square metre for fertile paddy fields. The farmers should have been compensated for paddy production over a period of 30 years, since they have lost their livelihoods and their only form of employment opportunity as well.

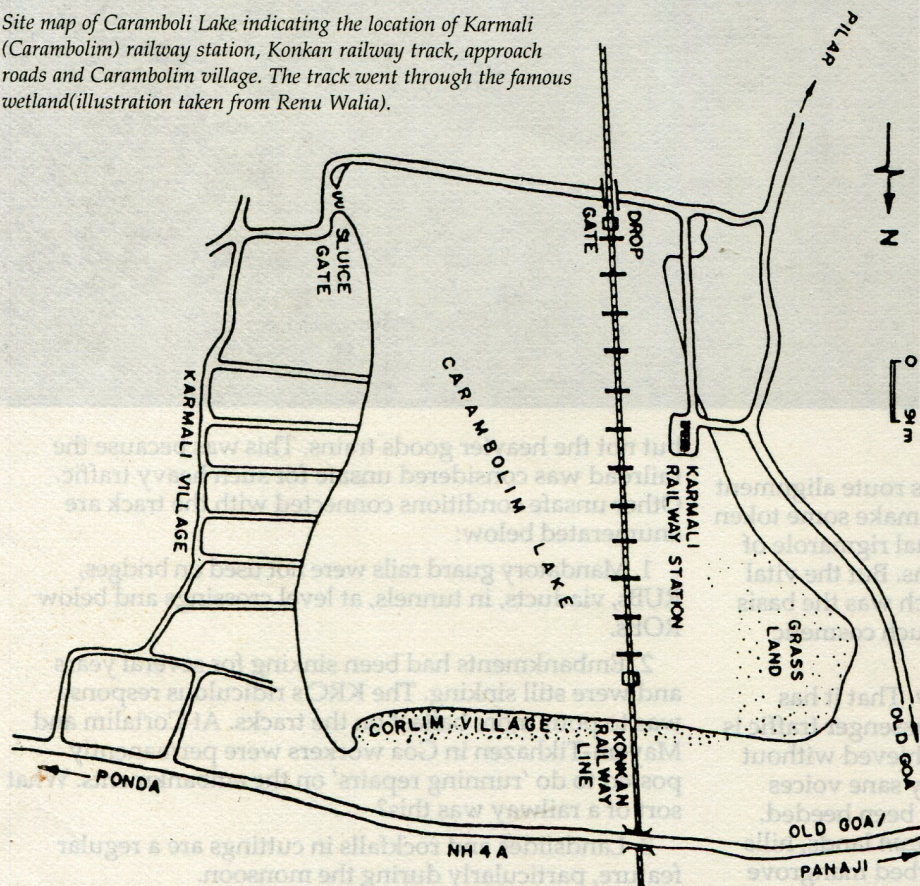
The missing safety and other facilities enumerated above, if and when installed, will eventually cost the KRC another Rs 1000 crore. At the moment, the Corporation is already in hock for over Rs 3000 crore. Its debt/equity ratio is 4:1 and nobody will lend it a penny any more. Its operation and maintenance losses are Rs 70 lakh per day and the interest burden is Rs 80 lakh per day. So it needs a subsidy of Rs 1.5 crore per day just to keep its head above water.

The resulting debt trap has rendered its much vaunted Build-Operate-Transfer (BOT) scheme into a joke in the financial world. The Corporation, in fact, has been reduced to beggary and its creditors are biting their nails, with the exception of ANZ Bank which got a 'letter of comfort' from former Union Law Minister R. D. Khalel for its loan of \$120 million! ANZ is now laughing all the way to the bank.

This is because at the time ANZ advanced KRC the \$120 million loan, the dollar was worth Rs 32. The following year, the dollar was already worth Rs 43. So ANZ's initial investment of Rs 384 crore became Rs 516 crore in just one year because of devaluation. In addition, there is the interest burden of 70 basis points above LIBOR which KRC will pay each year on a compounded basis for 5 years according to the ANZ agreement. By

Railway through Carambolim lake

Site map of Caramboli Lake indicating the location of Karmali (Carambolim) railway station, Konkan railway track, approach roads and Carambolim village. The track went through the famous wetland (illustration taken from Renu Walia).



Konkan Railway Dates

1974-75:

Alignment through midlands of Goa approved by Kakodkar government and notified in the Statutory Regional Plan.

1990:

Konkan Railway Corporation is formed.

Dec. 1990:

Goa Government approves new alignment through *khazan* lands. Opposition to the alignment begins to increase.

1992:

Ministry of Environment sets up an Expert Committee which files a report saying chosen alignment is fine.

March 26, 1993:

Prime Minister Rao orders a stop to the work on the project between Mayem and Bali. Commission of Inquiry headed by Justice Oza is appointed to examine the alignment. Justice Oza rules in favour of the chosen alignment on the ground that the railway was not being designed to carry monkeys.

October, 1993:

Work resumes on the disputed sector.

January 26, 1998:

Train makes first journey from Mumbai to Margao.

May 1, 1998:

Prime Minister dedicates railway to the nation.

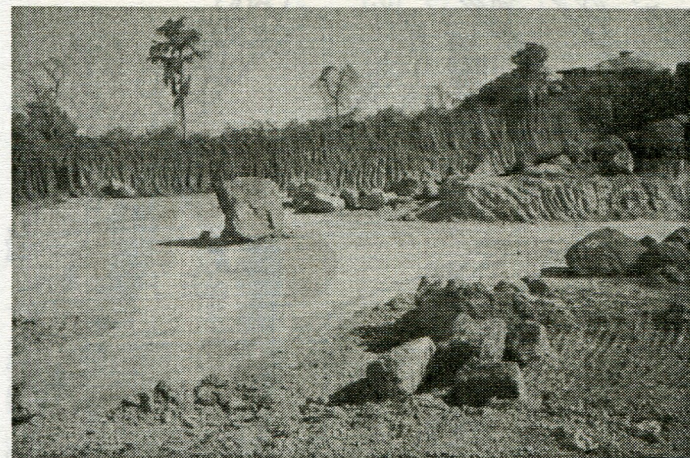


Hill removed for embankment at Tikhazan



Embankment at Tikhazan collapses and chokes surface drainage

Devastated hill excavated on the island of Diwar



then, the dollar may be worth Rs 50 (at the time of writing, it is already Rs 48). KRC's Rs 384 crore loan in 1997 may eventually cost the country Rs 1000 crore when paid back in 2002!

Thanks to the shoddy workmanship, design and materials used, the KR trains today run at an average speed of 50 kmph against the promised speed of 160 kmph! The Corporation, to recover the costs of its inefficiency, actually overcharges its customers by 'loading' the distance travelled. The distance from Canacona in South Goa to Mangalore is 280 kms, but the ticket shows the distance as 392 kms. The customers pay for 112 kms they did not travel.

Customers not only pay more and travel less, but they are also subject to endless time delays en route. During

the first 3 weeks of the 1998 monsoons, the Margao-Mumbai trains were late every day, the delays ranging from 3 hours to 23 hours. There were at least 13 derailments, 132 landslides and 2 embankment collapses in this period. However, most of these occurrences went unreported as they took place in God-forsaken places where the people have no access to the media which could not be bothered by the accident anyway.

More than 50 years after independence it is indeed surprising our politicians, technocrats and bureaucrats can perpetrate such massive financial frauds in broad daylight. Together they have made people like the late Harshad Mehta and Pawan Sachdeva look like small-time pickpockets in comparison. There is no sign of either responsibility or accountability on the horizon. This project was estimated to cost Rs 1042 crores in 1990 when the KRC was formed. Today it has already cost the people of India Rs 4000 crore and, besides being incomplete and shoddy, it is already an economic basket case.

Since January 1999 things have gone further down hill for the Konkan Railway Corporation (KRC) and the situation can only get worse from here on. Between August 1999 and October 1999, the KRC was forced to borrow Rs 626 crores in the form of bonds to keep its head above financial waters. If market forces were allowed free play, the KRC would not even be able to raise Rs 626! The Rs 626 crores worth of bonds are guaranteed by the Central Government through a 'letter of comfort'. In a couple of years even the moribund Indian Government will wake up to the discomfort caused by their 'letters of comfort' bonds.

All along the Konkan, thousands of hectares of fertile and productive paddy fields have been rendered useless. Waterlogging has turned these rice paddies into stagnant lakes and mosquito infested swamps.

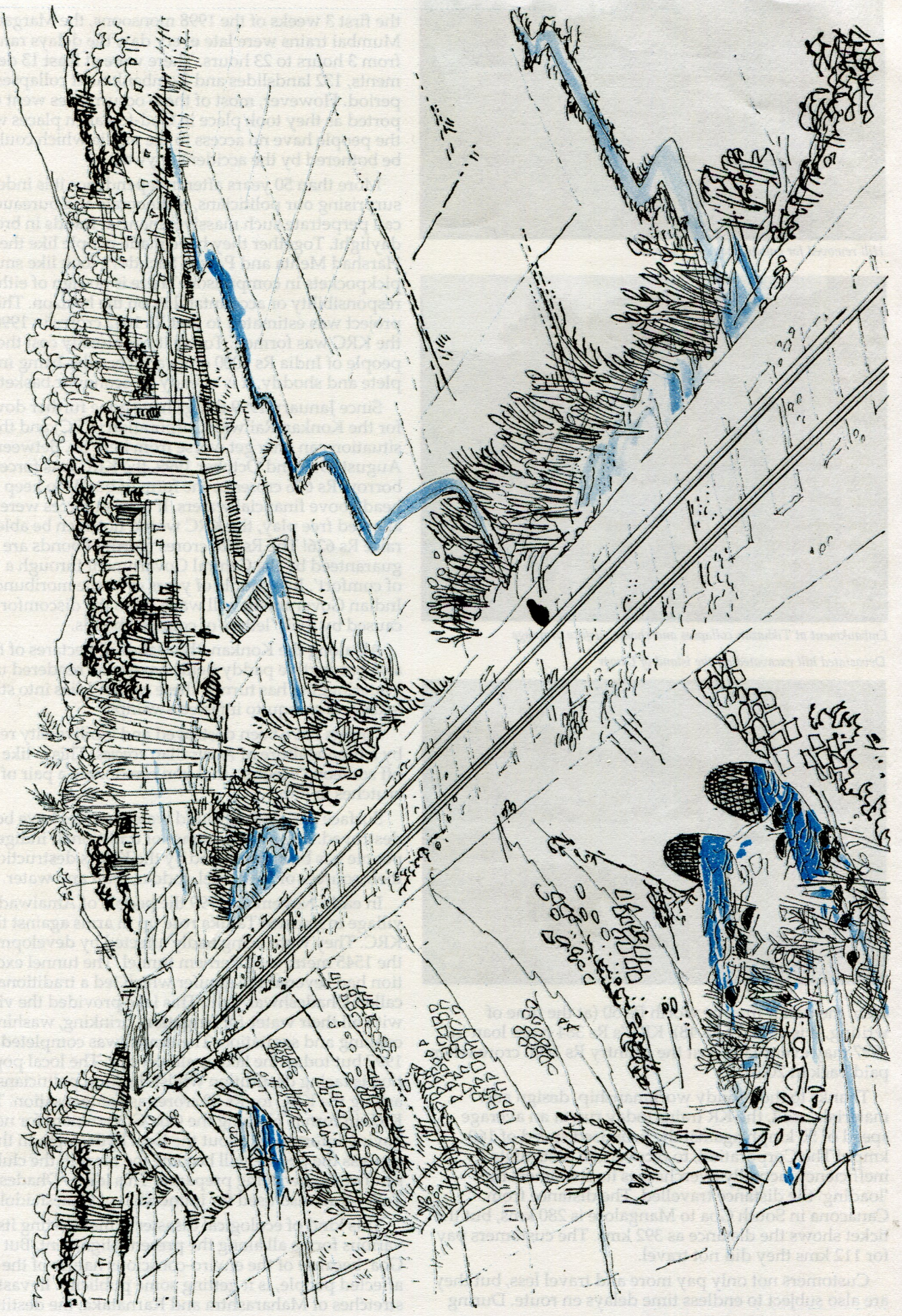
Forests have been destroyed and biodiversity replaced by a monoculture of Australian *acacias*. This is like cutting off someone's legs so that you can donate a pair of crutches to him.

Surface and underground water sources have been destroyed. The independence of traditional/indigenous people has been destroyed by the KRC's destruction of their sources of food, fuel, fodder, fruit and water.

In early November 1999 the people of Amaiwada village in Pernem Taluka rose up in arms against the KRC. They were being badly affected by developments in the 1545 metre long Pernem tunnel. The tunnel excavation had severed the aquifer which fed a traditional lake called Dhadeshwar Talli. This lake provided the villagers with all their water for irrigation, drinking, washing, cooking and sanitation. The tunnel was completed in 1997 but today the lake is almost dry. The local population is facing destitution whilst the local politicians are asking the KRC for Rs 50 crores as compensation. The KRC in turn is blaming the Goa Government for not having informed it about the local hydrology. In the process the people will become the meat in the club sandwich now being prepared. This lake—Dhadeshwar Talli—was also used for immersion of Ganesh idols.

This kind of ecological disaster is manifesting itself in various forms all along the present alignment. But only in Goa, because of the enviro-conscious nature of the affected people, is it getting some publicity. In vast stretches of Maharashtra and Karnataka, the destitution is

Artist's depiction of Konkan Railway alignment through a khazan in North Goa. The movement of the water was from right to left in the picture. The embankment has now clogged the drainage in several places, thus changing the area into an unproductive marsh. No rice will grow. In the Tikhazan case, the Deputy Collector directed the Konkan Railway to cough up Rs 7.20 lakhs for damages to rice fields over four years.



An Unsung Hero's Fight for Justice

The Konkan Railway embankment at Tikhazan, Mayem (see sketch alongside) is a prime example of how KRC's alignment has resulted in waterlogging, damage to the land and crop loss.

Around 700 metres of the Konkan Railway track pass through the paddy areas of Tikhazan belt of Mayem village, affecting 250 tenants.

The alignment divided the paddy area into two parts, comprising 30 and 24 hectares. During the monsoon, water coming down from Mayem valley and from Pilgao spread all over the paddy area, as the drainage and poims had been cut by the embankment. As a result, water began to get stagnant in 20 hectares of paddy field in the *kharif* season. The farmers who owned the fields were badly affected during these three years due to flooding and stagnation.

The Tikhazan case is one of those where the farmers struggle against the high-handed ways of KRC was at least partially successful. This was largely due to the efforts of a committed environmental activist, Anand Gaonkar.

Anand came from an ordinary, fairly underprivileged, background. He worked as an LDC in the Institute of Psychiatry at Bambolim. For him, environment protection was not a luxury, but a matter of survival. And Anand had the generosity

and the perseverance to make the concerns of folk like him his own.

He organised the villagers into the Tikhazan Tenants' Association and became its President. In February 1997, the farmers, under his leadership, first complained about the problems faced by them over three years after the Konkan Railway began building huge embankments through their *khazan* fields. Anand fearlessly led the battle. They had been deprived of access across their fields. To cross their fields, they had to walk over a tall embankment, which was at least 10.5 metres high. Anand sent a memorandum to various concerned authorities, which fell on deaf ears.

For several years, he ran from pillar to post fighting an indifferent Konkan Railway Corporation Limited (KRCL), first, for trying to get the Corporation to implement remedial measures to save their paddy fields, and thereafter, for compensation.

He persuaded the Goa Foundation to assist the Tenants' Association to file a petition in the High Court, praying for directions to the KRC to take remedial steps to redress the farmers' grievances. The Court passed directions but KRC dilly-dallied on the implementation once the petition was disposed of. Anand continued to move the authorities to bring pressure on the corpora-

tion to implement necessary and agreed safeguards. Later, he pursued legal action in the Deputy Collector's court and organised the Agriculture Department to visit Tikhazan and assess the damage to paddy fields.

Though his initial efforts to get compensation failed, Gaonkar refused to give up and continued his fight for the compensation firmly convinced that justice would prevail. His faith succeeded.

In a significant order, the Deputy Collector and sub divisional officer, Bicholim, eventually directed KRCL to pay the tenants' association compensation of Rs 7.20 lakhs at the rate of 90 paise per square metre for 20 hectares of land for crop loss during the years 1996, 1997, 1998 and 1999, after 60 days from the receipt of the order. Tragically, Gaonkar died a few days before the Deputy Collector announced the compensation award. Even more distressing to relate, though the order has been passed in early 2001 itself, the affected villagers are still struggling for the compensation to materialize!

Though Anand Gaonkar is no more, the aggrieved farmers of Tikhazan can never forget his dedicated efforts to bring KRC to book. Sad to relate that though the railway line has caused so much destruction, KRC has by and large got away without rendering proper accounts and compensation.

resulting in a growing population of displaced persons. It is this silent majority which will never be accounted for in any cost-benefit analysis done of the railway in the future. Their displacement in time and space will make sure of that.

The Pernem type of situation is replicated in every taluka through which the KR passes in Goa: Revora in Bardez, Dhonxi *Khazan* in Bicholim, Karmali to Neura in Tiswadi, Cortalim in Mormugao, Majorda in Salcete, stretches of Quepem and Canacona. Unfortunately the affected people in Pernem, Bicholim, Tiswadi, Quepem and Canacona are rather diffident about complaining to the authorities. This is largely because they placed themselves in the camp that welcomed the disputed alignment and supported the present alignment against the realignment activists who were mainly from Bardez, Salcete and Mormugao. The politicians and the KRC were able to engineer this divide along the lines of religious differences.

The KRC was asked to stabilise the side slopes of the cuttings and the railway embankments by a massive afforestation programme. The MOEF recommendations for this have been set aside because the side slopes are collapsing all over. The KRC has no time to wait for trees to take root and grow. So they are now forced to look for a technological fix. The embankment side slopes are being stabilized by stone pitching, berming and a greatly increased use of ballast on the permanent way. The side slopes in the excavated cuttings are being fenced to prevent rock falls and other collapses finishing up on the railway track. These 'end of pipe' solutions will prove to be a constant drain on the finances of the KRC. At present

the government is keeping the KRC alive with expensive life support systems which must soon give way to euthanasia. In the Central Budgets for 2000-1—and for the next ten years—the Finance Ministry has made a provision of Rs 350 crores per year for meeting the interest burden of the KRC. That's a total of Rs 3,500 crores, which as anyone acquainted with the railway will tell you, is the cost of construction of the entire railway!

The KRC is trying hard enough to salvage some benefits from the unmitigated disaster that the railway has become. The passenger traffic alone cannot pay for itself in spite of the 40% 'loading' on the distances travelled. Overcharging their passengers by 40%, at the most, allows them to break even on their running (operation and maintenance) costs. Thus, the KR has become India's biggest non-performing asset or more like a running liability.

At present, however, there are thousands of beneficiaries of this railway who sing the KRC's praises. A traveller boarding a train leaving Mumbai at 10.30 pm goes to sleep in his bunk immediately. At 10.30 the next morning, after a good sleep and a hearty breakfast he lands at Margao—if the train is on time. On the return trip he boards at 6.00 pm at Margao and arrives in Mumbai at 6.00 am the next morning. For the city dwellers—especially businessmen—this is an ideal combination. They get their work done without missing a single working day and without losing a single night's sleep. But at what, and whose, cost!

Anthony Simoes

Writ Petition on the Railway's Impact on the Environment

Goa Foundation Writ Petition on Konkan Railway Environment Clearance — The Goa Foundation decided in April 1992 to file a Writ Petition regarding the Konkan Railway Project in Goa. The Foundation made this decision after it came across a set of letters that were being exchanged between the Ministry of Environment and Forests (MoEF), New Delhi, the Railway Board and the Konkan Railway Corporation (KRC). It appeared from the letters that the KRC did not have the required environmental clearance for its project. The Ministry had also informed the KRC not to commence any work until the Environment Impact Assessment (EIA) of the proposed alignment through Goa and also in the other states was completed.

The Writ Petition prayed for only one relief: namely, a direction to the KRC not to continue any work till it obtained the mandatory approved EIA from the Ministry. The petition did not concern itself with the relative merits of the coastal or hinterland alignments. The High Court however dismissed the petition after it held that neither the Forest Conservation Act, 1980, nor the Environment Protection Act, 1986 could restrain the KRC from carrying out any works which it sought to do under the Railways Act of 1989, a later legislation.

The Goa Foundation appealed the order in the



Clearing of vegetation and construction of embankment through khazans

Supreme Court. However, since the MoEF subsequently granted environment clearance to the project, the Foundation did not press the appeal.

In early 1993 Prof. Madhav Gadgil and his colleague, in a signed article in *Frontline* stated that the EIA done by them was for a route that was

substantially changed by the KRC later, thus indirectly supporting the Foundation's stand that even upto now no EIA for the present alignment exists. Neither is there an Environment Management Plan. The KRC steadily refuses to implement conditions imposed on it by the Environment Ministry.

Konkan Railway konks out trees

Government of Goa, Official Gazette Series II No.22, Notification No. 4-3-91-FOR:

'In exercise of the powers conferred by section 31 of the Goa, Daman and Diu Preservation of Trees Act, 1984 (Act 6 of 1984) (hereinafter referred to as the 'said Act'), the Government of Goa after having considered it necessary to do so in the public interest, hereby exempts all species of trees in the private areas coming under the alignment of proposed Konkan Railway in South Goa as well as in North Goa District of the State of Goa from the provisions of the said Act subject to the condition that the provisions of section 41 of the Indian Forest Act, 1927 (Central Act 16 of 1927) and chapter V of the Goa, Daman and Diu Forest Rules, 1964, shall *mutatis mutandis*, apply to the transportation of the said felled trees.'

That order of the Governor of Goa dated July 29, 1992 was followed later by two further orders issued this time by the Ministry of Environment and Forests. The first granted environment clearance for the project; the second allowed the project to divert 37 hectares of forest land for the railway on condition that afforestation was carried out on plots elsewhere by the forest department with money allocated for the work by the KRC.

But most of the environmental damage that ensued from the construction of the railway is yet to be repaired. No rehabilitation plan has been imple-



Mangrove area removed for the alignment at Neura-o-Grande

mented to shore up the borrow pits to be found in most of the hills along the track from which huge quantities of mud were excavated for the purpose of making the massive railway embankments. In many of these areas, severe gully erosion is now the order of the day, with frequent land slips.

None of the mangroves that were felled to make way for the track have since been replaced.

The environment clearance granted to the railway required the KRC to take steps to stabilise

the slopes that had been cut for the borrow pits. Neither the Ministry of Environment nor the Goa Government could be bothered about enforcing the conditions imposed, since all this would require additional funds which the railway does not have, being already deeply in debt.

In such circumstances, the environmental disturbances inaugurated by the railway will remain a permanent scar on Goa's red earth.

The Goa-Hyderabad Pipeline Project

The latest infrastructure project proposed for the State of Goa is the Goa-Hyderabad Pipeline Project for transportation of natural gas from Goa to Hyderabad via Kolhapur, a major town in Maharashtra. The takeoff point from Goa is at Sancoale and the exit point is north of Sanquelim. The proposal is being made by the Goa Transportation & Infrastructure Co.Ltd. (GTIL).

The length of the full pipeline is 660 kms and of these 53.3 kms are in the State of Goa. The pipeline is proposed to be laid underground with a minimum soil cover of 1 m. It will follow the natural contours of the terrain, and GTIL proposes to fill up the trenches after the pipeline is laid and to restore the ground to its original condition.

The Goa station, being the originating station, will have facilities for filtering, metering and master control for pipeline operations. Compressors will be used for pushing the gas down the pipeline.

Under the EIA Notification issued under the provisions of the Environment Protection Act, 1986, such gas pipelines will have to submit to a public hearing. While the Karnataka and Maharashtra governments have already announced public hearings, nothing has been done in relation to the public hearings in the State of Goa.

The safety of the pipeline, particularly facilities for leak detection, is paramount in such a system, as any untoward accident can have enormous human and environmental impacts. This can be all the more aggravated since the alignment of the pipeline will naturally be through areas that will not have access to roads, etc. Just because GTIL wishes to lay a pipeline is no reason why the Goans should submit.

The Konkan Railway project is still fresh in people's minds. It has not only bifurcated the territory into East and West but turned the State into a mere corridor for the movement of interstate trains. Few of them stop at any of the stations in Goa.

Similarly, in the case of the pipeline, if some of the gas could be utilised for the purposes of persons residing in the forest stretches of the State, this would have a positive environmental impact in so far as it will lead to reducing fuel from the natural forests.

Goa must have direct benefits from the pipeline rather than being a mere conduit, since being a conduit involves exposing the State to environmental hazards for free.

A lot of approvals are still to be procured for the pipeline. Besides, environment clearance, approval is also required for forest area crossings,

local permits for crossing rail, rivers, canals, highways and Government land. Worse, the project proposes to acquire a 30 m wide right of way under the Petroleum & Minerals Pipeline Act of 1962. If one calculates this area for a stretch of 53 km, it may be seen that a considerable area will have to be sacrificed by Goans for the project. It is important that Goan citizens should be consulted in the matter instead of the authorities merely presuming their acquiescence. Government should remember that if they begin to raise objections, it may delay the project for a considerable time.

International Airport at Mopa

Just as the villagers and farmers of Mopa were beginning to breathe easy after their struggle against proposed bauxite mining on their lands, a fresh threat has emerged—that of a new international airport. In early 2000, the Union Civil Aviation Minister made a statement in Goa regarding this airport, and the media state that the Governor has even carried out an inspection of the site.

The proposal to construct an international airport at Mopa is one of those harebrained schemes that the people of Goa do not know whether to take seriously or not. Mopa lies at one corner of the state, at quite a substantial distance from the major tourist areas of the state. Having the airport here would mean a three-hour bus ride for tourists before they make it to the hotels along the important tourist beaches. But development schemes are hardly ever planned on the basis of logic.

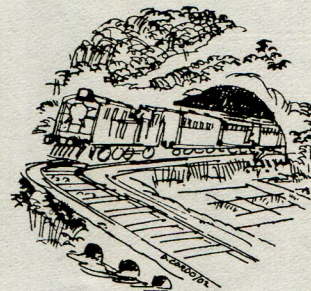
The ostensible reason for construction of an airport here is that the existing airport at Dabolim belongs to the Navy, which severely restricts the use of the airport for civilian flights. This may have been true at one time, but over the years the Naval authorities have been forced to make concessions. The number of flights permitted has steadily increased and now the Navy has even agreed to permit use of the airport for civilian flights at night.

This would make it appear that the rationale for the airport at Mopa no longer exists, but the proposal continues to be pulled out of cold storage, dusted off and resurrected every once in a while.

To begin with, the land acquisition will be of the order of 10 sq kms. In addition, land will have to be acquired for supplementary support service that will automatically gravitate towards this international/national role. Also, land will have to be acquired to prevent development around some parts of the airport depending upon the alignment of the railways which will determine the landing approach and corridors.

Since Mopa is at the northern extremity of the state, it will have to be connected to the central and southern parts of the state where the predominantly tourist traffic will be heading already. The KRC is making appropriate noises about being able to provide a N-S transport artery by virtue of an ELRTS (Elevated Light Rail Transport System). The KRC is not telling anyone that the ELRTS will cost almost as much as the airport itself. This will result in a total investment of Rs 4000 crores. This is not only a huge outflow but it will never pay for itself because of high capitalisation cost combined with low utility. An invisible cost will be the redundancy of the Dabolim airport.

The obvious cost will come from noise pollution. Aircraft make maximum noise during takeoff because the engines develop maximum thrust when the aircraft is at ground level. People living along the takeoff corridor can be badly affected especially since international flights prefer to land and takeoff between midnight and 6.00 am when ambient temperatures are lower. Air pollution will also be highly concentrated during takeoff. A jumbo jet burns aviation turbine fuel @ approximately 500 litres per minute during takeoff.



RELIANCE SALGAONCAR POWER PLANT

The Reliance-Salgaoncar Power Plant Ltd (RSPPL) 40 MW naphtha-based power project was meant to increase energy availability in Goa even as the state was unable to utilise cheaper energy from the Central Government's allocation. In 1996 the Central Government allocated Goa 306 MW but the state's receiving stations were only capable of accepting 180 MW.

Instead of improving the receiving station capacity by commissioning relatively cheap power transformers to receive the central energy supply, the Goa Government preferred to go in for a very expensive power plant which could not but generate expensive energy. Politicians heading governments always want new projects for the kickbacks they bring and this project was designed to favour the Reliance-Salgaoncar lobby. Huge energy guzzling ferro-alloy plants in the Cuncolim industrial estate were stealing energy and the Goa Government was writing off the theft by claiming high (26%) T&D losses till the High Court intervened. If the T&D losses were indeed 26%, then it made no sense (technical, financial or common) generating more expensive power so that 26% of it could be wasted. Building a power plant in Goa would also increase the pollution load on the environment whilst making huge demands on scarce resources like land and water.

It was more sensible and cost effective therefore to improve T&D. If the internal losses, caused by outdated conductors, were reduced from the present 26% to a reasonable 10%, the savings on the available 406 MW from the Centre would be of the order of 65 MW. Proper billing of stolen energy would have wiped out the power department's financial deficit. Besides consumers would have got adequate power supplies with improved quality.

Reliance-Salgaoncar 40 MW Power Plant at Sancoale

Despite this, the government went ahead with the RSPPL project. The plant was initially approved as a 40 MW open cycle plant, because the RSPPL quotation for a combined cycle power plant was higher than the competition.

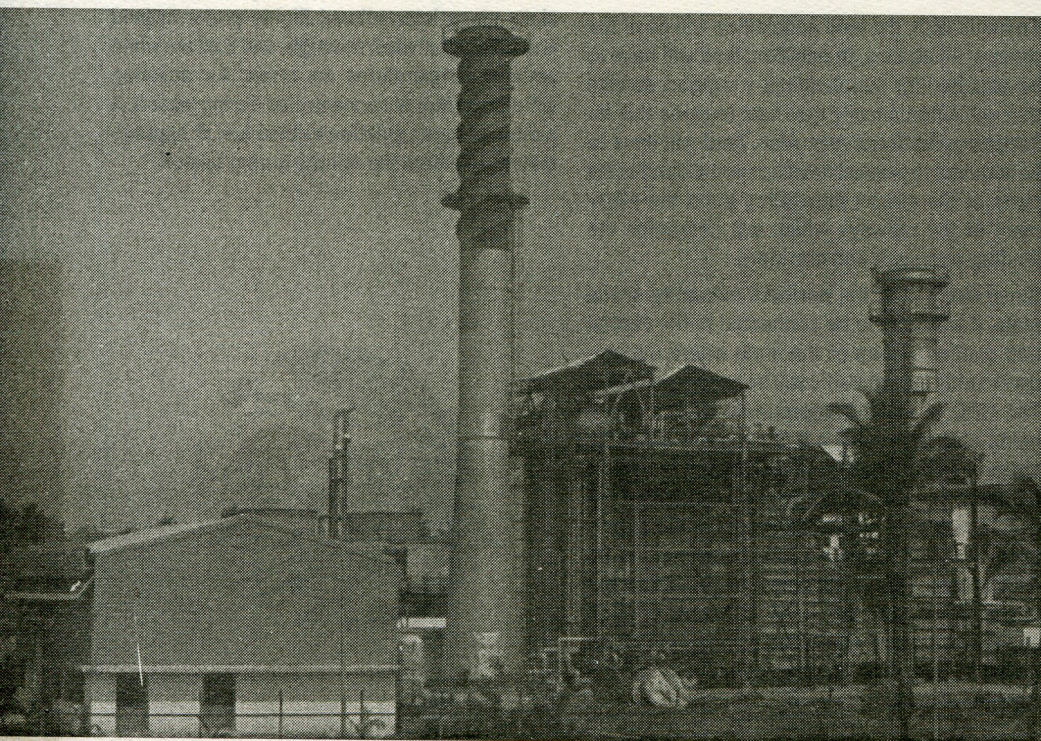
When GF objected to the higher pollution load of an open cycle plant, the Goa Government quietly rewrote the PPA for a combined cycle power plant without re-tendering. Today the RSPPL is a 60 MW combined cycle plant built at a cost of Rs 160 crores. At 90% Plant Load Factor (PLF), the Goa Government evacuates 48 MW and then uses only 35.52 MW since 12.48 MW is lost during transmission and distribution.

The RSPPL has only made the situation worse in terms of quality since its generation parameters (voltage and frequency) would never match those of the central supplies. To avoid the associated synchronisation problems, it was suggested by CRISIL (the expert organisation that vetted the project proposal) that the RSPPL supplies be islanded. This was possible since the 33 KV grid in Sancoale, where the RSPPL is located, can be isolated from the rest of the Goa grid. Even this suggestion was rejected since the Government wanted to spread the high cost of RSPPL energy over the whole of Goa and thus dilute its impact. RSPPL covered itself by adding a deemed generation clause in the Power Purchase Agreement (PPA). If synchronisation were not possible then RSPPL would protect its equipment by disconnecting its plant from the grid but would continue to bill the electricity department for energy at 80% PLF. So the consumers would pay for energy not generated @ 80% of RSPPL's installed capacity which works out to approx. Rs 2.5 lakhs per hour.

Today we have a comical situation where the Goa Government sells cheap (Rs 1.8/unit) central allocation energy to other states whilst purchasing expensive (Rs 5.25/unit) energy from RSPPL. Plus we bear the pollution load from burning 5000 tonnes of naphtha. So we are indeed governed by a bunch of idiots.

GF objected to the RSPPL on environment and economic grounds. For example, the power plant proposed to use a 'once through' cooling system. This means that the water used for cooling the gas turbine gets discharged into a storm drain. This water should have been re-circulated for cooling and then re-used. This would result in evaporation losses in the cooling towers of about one lakh litres per day. In the existing 'once through' system, the plant uses 40 lakh litres of potable water per day even as the people of the state are starved for water.

As per the PPA, the tariff charges for RSPPL energy depend largely on the price of naphtha in the international marketplace. The fuel cost accounts for 68% of the energy tariff as per the formula agreed upon in the PPA. The tariff is also subject to variations in the Rupee-Dollar parity



rates. Because of these two factors, the Government of Goa is today buying RSPPL energy @ Rs 5.25/unit as opposed to the original PPA estimate of Rs 2.01/unit. RSPPL played down the cost of naphtha in its project proposal, using a rate of Rs 32 per dollar in 1996 even though the dollar conversion rate at that time was Rs 37.

In 2002 the price of naphtha varies between Rs 12,000 and Rs 19,000 per tonne and the rupee is down to Rs 48 per dollar. There is a distinct possibility that the PPA signatories may dilute environment protection norms to reduce costs and retain profitability. If RSPPL decides to save on desulphurisation costs then the SO₂ levels in the exhaust gases will cause havoc with the air pollution levels around the plant.

NEW INFRASTRUCTURE PROJECTS

Outer Harbour — This will be a 100 acre man-made island which will be created in the sea to harbour ships discharging imported Petroleum, Oil and Lubricants (POL). The POL outer harbour is to be located between Baina beach and Pequeno island.

The project will involve massive dredging operations to carve out a harbour basin and to prepare an approach navigational channel for the tankers. There will be huge civil construction works, including underwater work, for caissons, structures, superstructure, plant, machinery, tanks, maintenance workshops, accommodation and administration block, which will completely ruin marine life.

Construction work will also include a causeway connecting Baina beach on the mainland with the Outer Harbour for access road, pipelines and other reticulation. Corresponding infrastructure on land will include tank farms, pipeline, load cuts and marshalling yards.

The project will cost at least Rs 6,000 crores and will be put up by Reliance Petroleum with foreign collaboration. There will be major destruction and disruption of marine life during the five year construction period, especially for the deep foundations (caissons) for the island itself. Dredging of the approach channels and the harbour basin will be disastrous during both excavation and dumping of silt and rock. Similar impacts will occur whilst erecting piers for supporting the approximately 900 metre long causeway from the island to the mainland.

Once the harbour is commissioned, there will be operational leakages and minor spillages. In the event of a major sustained discharge of some product, just about anything could happen, including a fire or an explosion. Subsequent damage to air, sea water and marine life could be disastrous.

MPT Expansion — Over the last few years the MPT has been quietly expanding its activities and berths. The Central Government believes that ports are an essential gateway on the road to globalisation. Ports and airports, according to the government, provide two-way access to economic nirvana.

The mining lobby in Goa is totally dependent on the performance of the MPT for its survival. Since the mining companies dictate terms to the Goa Government, they help MPT push through expansions that benefit them.

The Ministry of Commerce and Trade pressurises the MPT to create facilities for handling container traffic even as an internal container depot takes shape at KRC marshalling yard at Verna. This same marshalling yard will cater to an IOC tank farm which will serve the POL Outer Harbour. There goes 500,000 sq m of fertile land along with completed irrigation facilities provided under the Selaulim Project Scheme. The Goa Government does not have a clue that its development strategy is operating at cross purposes.

The Zuari fertiliser plant needs large quantities of naphtha as feedstock whilst the RSPPL needs it as fuel for its power plant which will no doubt be expanded. The Birla-Salgaoncar-Ambani axis has managed to convince the MPT to make provision for large-scale import of naphtha. MPT is now creating storage facilities in the form of an atmospheric pressure storage tank. But the Outer Harbour is supposed to be a dedicated POL harbour.

Sesa Kembla Goa needs coking coal for its pig iron plant in Amona, so MPT is quite happy to provide an entry point for Australian coal. What happens to Vasco city is nobody's concern, so what if coal dust, generated during handling, affects the residents. Human life even in relatively well-off Goa is cheap anyway.

Ultimately MPT will serve a hinterland of above 10,000 sq km thanks to the East/West running SCR and the North/South KR.

Environmental Impact: Because of the wide variety of import and export, it is very difficult to assess the environmental impact of the MPT operations but these are bound to be hugely negative. The beneficiaries will be few and far between but they have plenty of clout. The sufferers will be many but without clout to express their dissatisfaction.

Since the MPT expansion is not a onetime greenfield construction it is very difficult to put a financial cost upon it. It has been going on for decades and will carry on for another decade at least.

LNG Terminal — *Location:* Cabo de Rama. Reliance intends building a 5 MTPA LNG terminal for import of Natural Gas in liquefied form. The gas generated after regassification will be used to fuel a power plant, an integrated steel mill and gas cracker for a petrochemical plant. Extra gas left over will be piped to Kakinada in A.P.

The land requirements for all these projects will amount to 5 sq km. In addition, there will be huge port facilities. The dredging for the basin and the approach channel will be about 10 million cubic metres with 1,000,000 m³ being dredged every year for maintenance.

Environmental costs: With this kind of developmental agenda, a small state like Goa will become a pollution hot spot. During construction of massive projects like these, there is bound to be major destruction, dislocation and disruption of nature. Entire ecological systems and natural habitats will be totally wiped off the land. At sea, the huge dredging in the approach channel, turning circle and basin will result in displacement of 10 million m³ of silt/rock. Where will all this material be unloaded? What will be its effect on marine life in the area? Maybe the experts at the NIO can tell us if and when they are consulted by the powers who decide on such projects.

Anthony Simoes

THE KAIGA NUCLEAR COMPLEX

The pollution and environmental disaster threat to Goa from large industries has been present for many years now. The Zuari Agro Chemical fertiliser factory at Sancoale and Syngenta's [Ciba Geigy's] hazardous pesticide production plant at Corlim have long been hanging like a Damocletian sword over Goa.

In addition to these huge projects is an even worse danger that has emerged on the doorstep of Goa, the Nuclear Reactor Complex at Kaiga, across the Western Ghats, just 22 kms south of the Goa border.

The nuclear reactors at Kaiga are exponentially worse than the hitherto existing threats, as they involve not just environmental pollution but threaten even ordinary survival. Goa is now under siege from the threat of nuclear disaster.

It is by now a well-accepted fact that nuclear reactors are a danger to man's very survival. It has even been shown that they are not cost-effective. Kasli in Russia, Windscale (Sellafield) in the UK and Three Mile Island in the US showed that even the advanced industrial nations are unable to operate this technology in a safe fashion. After the devastation caused by these nuclear accidents came the well-known Chernobyl nuclear disaster. The human race can no longer pretend that it has not been properly cautioned about the chilling dangers this form of energy production involves.

The recent incident in Japan has been one more potent reminder of the risks these expensive toys entail. The West is beginning to phase out this technology but is ever-willing to palm it off on less developed countries. And our atomic energy establishment, to protect its own vested interests, has continued to get deeper and deeper into the morass.

Major Problems Associated with Nuclear Plants —

During normal operation, nuclear plants discharge varying quantities of life-threatening radioactive sub-

stances into the air. In the case of the Kaiga reactors, these emissions can be expected to move upwards into the ghats and get deposited in forests, grasslands and other areas. From here, the radioactive substances would get into the Goa watersheds and later the food chain, damaging people. They would also get deposited through rain clouds and rain in the general Goan environment.

The fact that people living in the vicinity of reactors suffer cancers far above those who do not, indicates that radiation from the plants is often uncontrolled and is life threatening. But the other major problem with nuclear reactors is the very real possibility of their suffering an accident. Even those who manage them acknowledge the fact that reactors are extremely complex and inherently dangerous. No doubt, engineers design elaborate safety systems, and other systems to back these up. But nothing is perfect. Either the operators or the technology fails. Accidents are quite frequent and, in England alone, average ten serious ones per year.

Should any one of the nuclear reactors at Kaiga go out of control (which is entirely conceivable) and a 'melt-down' or an 'explosion' occurs, this would lead to the release of vast quantities of radioactive elements and gases into the atmosphere. Radiation, of course, kills.

The Kaiga project has been beset with problems right from inception. That fears of an accident are not irrational doomsday projections is evidenced by the fact that in 1994, during construction, the dome of one of the plants collapsed. Despite this, the construction went on. In 1999, one of the reactors has been commissioned. One can only imagine what is likely to happen if a major accident to the structure were to take place after commissioning. The atomic energy establishment is blithely pressing on with completion of the project.

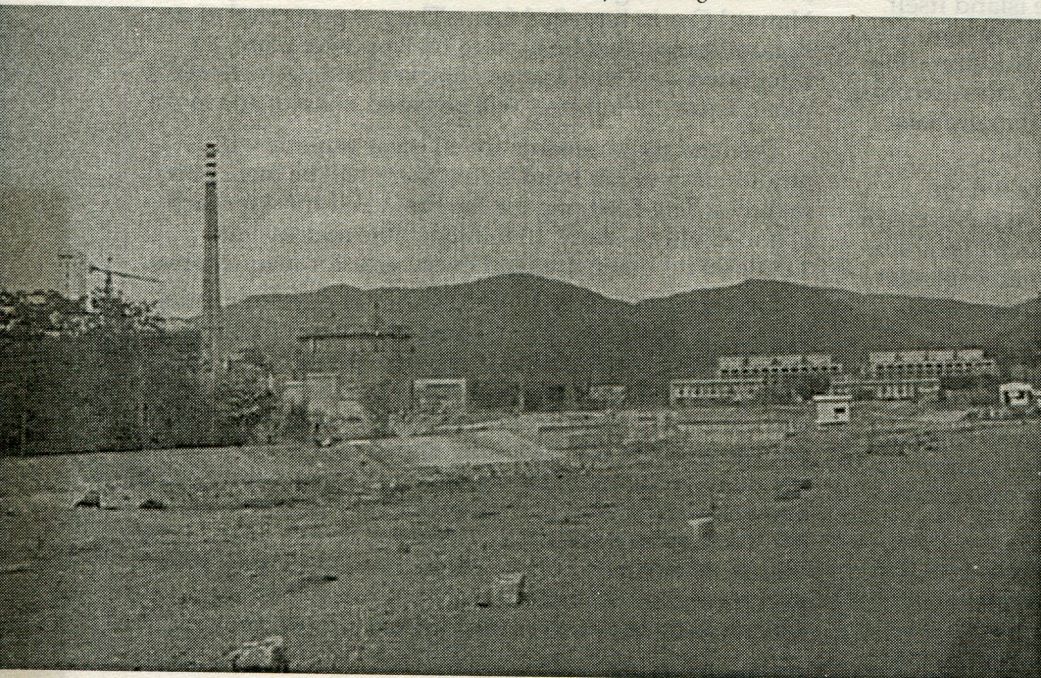
The fallout has not been confined to the project site alone. Here, of course, large swathes of prime forest have been lost when clearing the site for the plant and for the housing complexes for the staff. Located as the project is in the middle of pristine forest, construction of power transmission lines has involved cutting through dense

semi-evergreen and evergreen forest in Uttara Kannada district. This has been firmly resisted by the local people. If power from here were ever to be supplied to Goa, a similar process of destruction would begin with Goa's forests as well.

Implications for Goa of Nuclear Disaster at Kaiga — Shivaji Rao, Professor of Environmental Engineering at Andhra University, has made a detailed list of the areas that would have to be evacuated in the event of an accident at Kaiga. He wrote:

'Evacuation must be completed within 6 hours of an area 2 to 5 kms around the reactor; 12 hours for an area 5 to 25 kms; 24 hours for an area 25 to 75 kms and 48 hours for distances beyond 75 kms from Kaiga, as per the British accident scenario based on a wind speed of 5 m/sec,

Kaiga Nuclear Complex, where a dome of a reactor collapsed during construction



rainfall of 1 millimetre per hour and neutral stability conditions.

'Depending upon the weather conditions during the accident, certain areas will be more affected than others. While Karwar, Yellapur, Londa, Honavar, Kumta and Ankola of Karnataka, Chauri, Quepem and Madgaon of Goa lie within 77 kms, Bhatkal, Siddapur, Sirsi, Hangal Mundgod, Kalghatgi, Haliyal, Khanapur, Hubli and Dharwar of Karnataka and Panjim, Ponda, Bicholim and Mapusa of Goa fall within 115 kms distance from the proposed nuclear plant'.

According to Professor Rao's scenario, the population of the entire State of Goa would have to be evacuated within 48 hours.

How such an evacuation of 15,00,000 people is to take place in such a short time is not certain. It is not even known whether it is feasible. Certainly the NPC has no such emergency evacuation plan available. At the moment, the NPC is refusing to draw up such a plan simply because the very exercise might induce legitimate fears in the Goan population at large. However, even conceding that a 48 hour emergency evacuation is possible, the next question one asks is: when can the Goenkar return to his castle?

'After thorough scrubbing and decontamination of the lands and equipment due to radioactive pollution from an accident, people can return to their original homes along with their cattle after one year upto 140 kms after five years upto 114 kms and after 20 years upto 77 kms distance from the nuclear plant'.

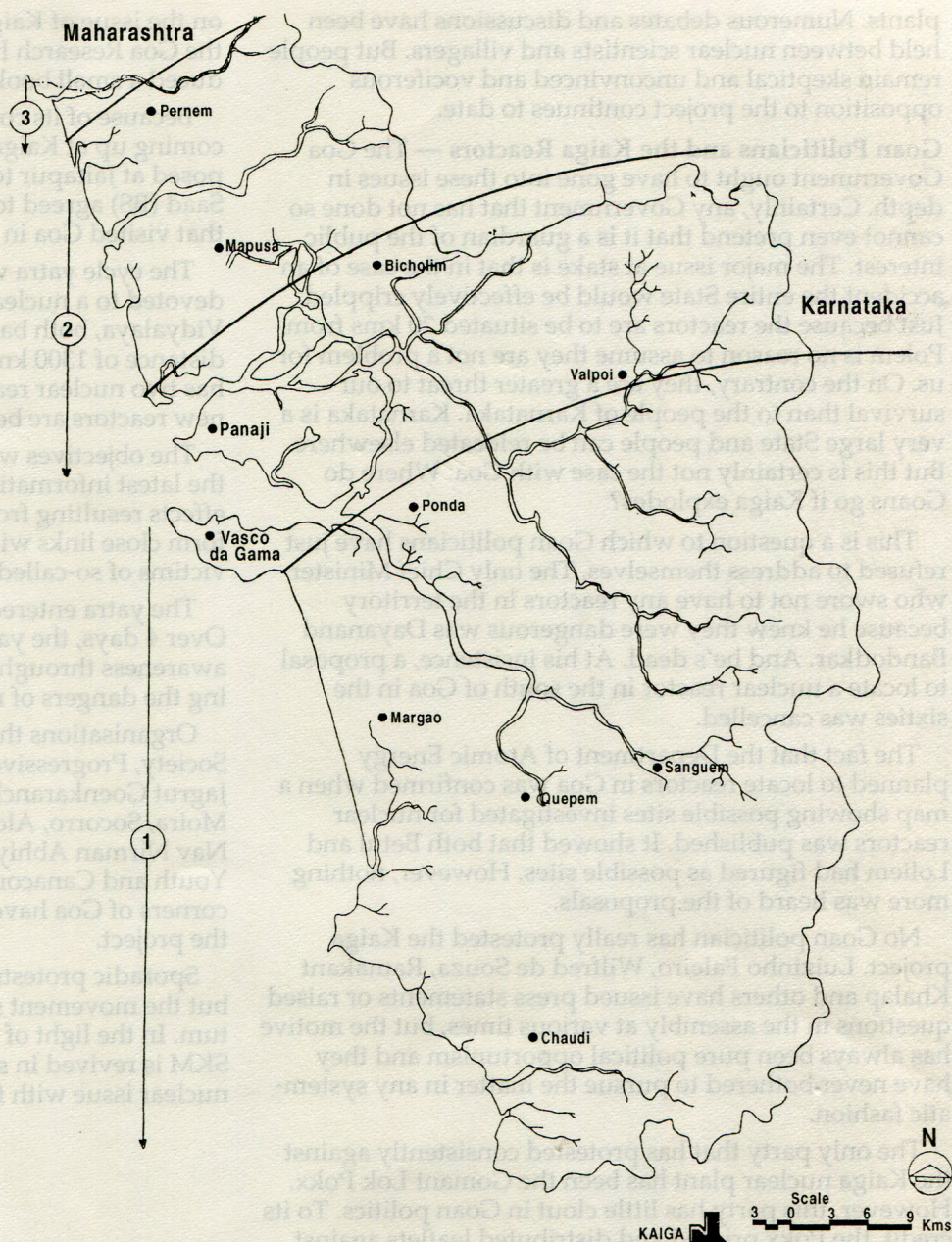
This means that the whole of Goa will have to remain uninhabited for a period of five years: the area upto Margao will remain out of bounds for human beings for more than 20 years.

Professor Rao addressed a letter to Chief Minister Rane in December, 1988, in which he called his attention to the potential risks to the State of Goa as a result of any nuclear accident at Kaiga.

'Radioactive pollution', he noted, 'does not respect political boundaries'.

Other Possible Accidents at Kaiga — Besides the real possibilities of an accident involving the reactors within, there are in the case of the reactors at Kaiga additional possibilities of accidents from without:

- The nuclear reactors proposed at Kaiga are going to be within 50 kms from Seabird, the largest naval base being constructed in India by the Indian Navy. During a war, the reactors would become the target of attacks and



Destructive range: Should a disaster erupt at Kaiga, Goans living in zone 1 will not be able to return for 20 years; those in zone 2 for 10 years; and those in zone 3 for 5 years.

thus endanger the maintainability of the naval base as well.

- The Kaiga site is downstream of six large dams. If any one of them breaches, all the reactors would be in serious trouble.
- The impounding of massive quantities of water behind six dams is also bound to induce tremors and earthquakes and these would naturally damage the reactors.

All these disturbing questions concerning the Kaiga based reactors have provoked a major outcry against the proposed reactor programme from the public in Karnataka. The protest has been so sustained and effective that the Karnataka Government has been forced to try and take the public into confidence about nuclear

plants. Numerous debates and discussions have been held between nuclear scientists and villagers. But people remain skeptical and unconvinced and vociferous opposition to the project continues to date.

Goan Politicians and the Kaiga Reactors — The Goa Government ought to have gone into these issues in depth. Certainly, any Government that has not done so cannot even pretend that it is a guardian of the public interest. The major issue at stake is that in the case of an accident the entire State would be effectively crippled. Just because the reactors are to be situated 20 kms from Polem is no reason to assume they are not a problem for us. On the contrary, they are a greater threat to our survival than to the people of Karnataka. Karnataka is a very large State and people can be relocated elsewhere. But this is certainly not the case with Goa. Where do Goans go if Kaiga explodes?

This is a question to which Goan politicians have just refused to address themselves. The only Chief Minister who swore not to have any reactors in the territory because he knew they were dangerous was Dayanand Bandodkar. And he's dead. At his insistence, a proposal to locate a nuclear reactor in the south of Goa in the sixties was cancelled.

The fact that the Department of Atomic Energy planned to locate reactors in Goa was confirmed when a map showing possible sites investigated for nuclear reactors was published. It showed that both Betul and Loliem had figured as possible sites. However, nothing more was heard of the proposals.

No Goan politician has really protested the Kaiga project. Luizinho Faleiro, Wilfred de Souza, Ramakant Khalap and others have issued press statements or raised questions in the assembly at various times, but the motive has always been pure political opportunism and they have never bothered to pursue the matter in any systematic fashion.

The only party that has protested consistently against the Kaiga nuclear plant has been the Gomant Lok Pokx. However, this party has little clout in Goan politics. To its credit, the Pokx printed and distributed leaflets against the reactors at Kaiga same years ago.

Citizen Action Against Kaiga — Citizen action in Goa against Kaiga erupted in the form of the Stop Kaiga Movement (SKM). One of the principle organisers of the movement was Erasmo Sequeira, who, like Khalap, Willie and Luizinho before him, seemed interested in exploiting the issue only for political mileage: in his case, to re-enter State politics. When Erasmo was trounced in the elections, he lost interest in Kaiga too. The SKM has not made a single move after the initial public memorandum.

This is a pity. The SKM, while it lasted, was able to gain the support of over 100 prominent Goan against the reactors at Kaiga. The setting up of the movement was a major shot in the arm for the people in Karwar and North Karnataka generally who were agitating against the plant.

Such a major issue should also have been taken up by Goa University. However, except for individuals like G R Bhat of the Physics Department of the University, no group that is seriously interested in the problem has emerged. Professor Bhat has written a book length study

on the issue of Kaiga and nuclear power. Apart from that, the Goa Research Institute for Development also produced a small booklet on the Kaiga problem.

Because of its concern over the Nuclear Complex coming up at Kaiga and another nuclear complex proposed at Jaitapur towards the north of Goa, the Bailancho Saad (BS) agreed to coordinate an anti-nuclear cycle yatra that visited Goa in April 1992.

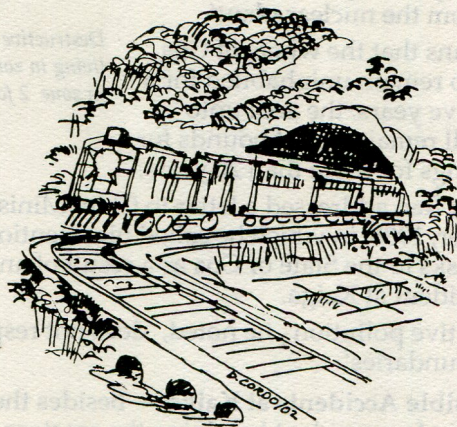
The cycle yatra was organised by Anumukti, a journal devoted to a nuclear-free India and Sampoorana Kranti Vidyalaya, both based in Gujarat. The yatra covered a distance of 1300 kms from Kakrapur in Gujarat (which has two nuclear reactors) to Peringome in Kerala where new reactors are being opposed.

The objectives were 'to bring to the notice of the people the latest information on the perils and adverse health effects resulting from nuclear power generation and to form close links with various people who have become victims of so-called development.'

The yatra entered Goa on April 11, 1992 at Pernem. Over 4 days, the yatra covered large areas of Goa creating awareness through public meetings and leaflets regarding the dangers of nuclear plants.

Organisations that worked with BS included Peaceful Society, Progressive Students Union, Siolim Youth Front, Jagrut Goenkaranchi Fouz, citizens' groups from Saligao, Moira, Socorro, Aldona and Parra, Nirmal Vishwa and Nav Nirman Abhiyan, Margao Coffee Club, the Utorda Youth and Canacona Citizens Committee. Goans from all corners of Goa have thus expressed their opposition to the project.

Sporadic protests against the project in Goa continue, but the movement seems to have lost its initial momentum. In the light of this, it is therefore important that the SKM is revived in some form and that it takes up the anti-nuclear issue with fresh urgency and ferocity.



SELAULIM DAM

Land under irrigation in Goa is barely 10 per cent of the net sown area as against the national average of 25 per cent. There are a number of reasons for this. Goa was liberated from Portuguese colonial rule only in 1961. The Portuguese had not been particularly interested in 'developing' the territory. Further, the undulating topography of Goa makes it exceedingly difficult to implement irrigation schemes.

Soon after Liberation, a decision was taken to build a large dam across the Sanguem river at Selaulim in Sanguem taluka. The project was investigated by the Central Water Commission (CWC) during the period 1964-70 and the project report was prepared by June 1970. The dam was designed as a dual-purpose scheme: to irrigate 14,500 hectares of land and store the equivalent of 35 million gallons of water per day for domestic and industrial consumers. Sanctioned in March 1972 at an estimated cost of Rs 961.20 lakhs (9 crores), work started in February 1976. The original cost was later revised twice to Rs 3,599.03 lakhs (35 crores) in September 1981 and to Rs 7,318.29 lakhs (73 crores) in November 1985. The dam was eventually completed at a cost of Rs 110 crores.

Selaulim water intake site

The case of the Selaulim Irrigation Project (SIP) presents one more distressing instance of the manner in which the development process is managed in the country. The dam has failed to yield its targeted benefit; yet, the cost has risen 10 times. Contractors have been changed mid-course and there have been a number of scandals associated with the project. About 643 families in Sanguem taluka were displaced, and despite the passage of more than 20 years, several families are still without adequate compensation or land though they lost all in the reservoir of the project. Major distortions have already emerged: water from the dam is yet to reach the farmers, but it has already reached swimming pools (the Ramada Renaissance was the first recipient). It reached Zuari Agro Chemicals a full two years before it reached Vasco citizens in April 1993.

Environmental Impact — One of the most important points to be kept in mind while assessing the possible benefits and losses accruing to the SIP is related to the dam's environmental impact.

By now it is a widely known fact that major dams have far reaching effects on the environment, nearly all of them adverse. There is by now a massive quantity of data and information available on the dramatic, often unintended changes they have brought in the ecosystem.

The Selaulim dam is the first major dam constructed in Goa, and it has caused tremendous environmental damage.

The dam proposal was finalised in the early seventies, when there was very little ecological consciousness, particularly amongst the Goan bureaucracy. Therefore, there was practically no study done on the project's possible environmental impact. The most that was done was to try and assess the value of the resources that would be lost. If the environmental damage had been more systematically studied (as in the case of Narmada) it is unlikely that the cost-benefit analyses which emerged would have been favourable enough to have the project approved.

First, let us take a look at the resource loss due to the dam.

Forests — About 706 hectares of the forest in Sanguem taluka were cleared as a result of the dam project. Sanguem is the largest taluka in Goa and it is also the most heavily forested with almost 52 per cent under forests. The process of construction of the dam has therefore only contributed to the further erosion of Goa's fast diminishing forest cover.

The loss of tree cover and consequent soil erosion will be one of the major problems facing the Selaulim project in the future. The forests on the hillsides have been cleared completely, leaving the area totally barren.



About 12 kms tract of forest was deforested for the purpose of building workshops and offices for the dam's construction personnel. For this purpose, all the vegetation and also a number of cultivated farms were completely destroyed. A large number of fruit trees were also felled.

About 20 acres of land were cleared for the construction of houses and bungalows for the offices and skilled personnel working on the same site. For the construction of the rehabilitation colonies at Vaddem and Valkinim, thick forest spread over an area of 25 acres and 10 acres respectively was destroyed.

Also, a new irrigated area of cultivable land had to be created for the purpose of compensating the displaced population for the land they had lost. A number of

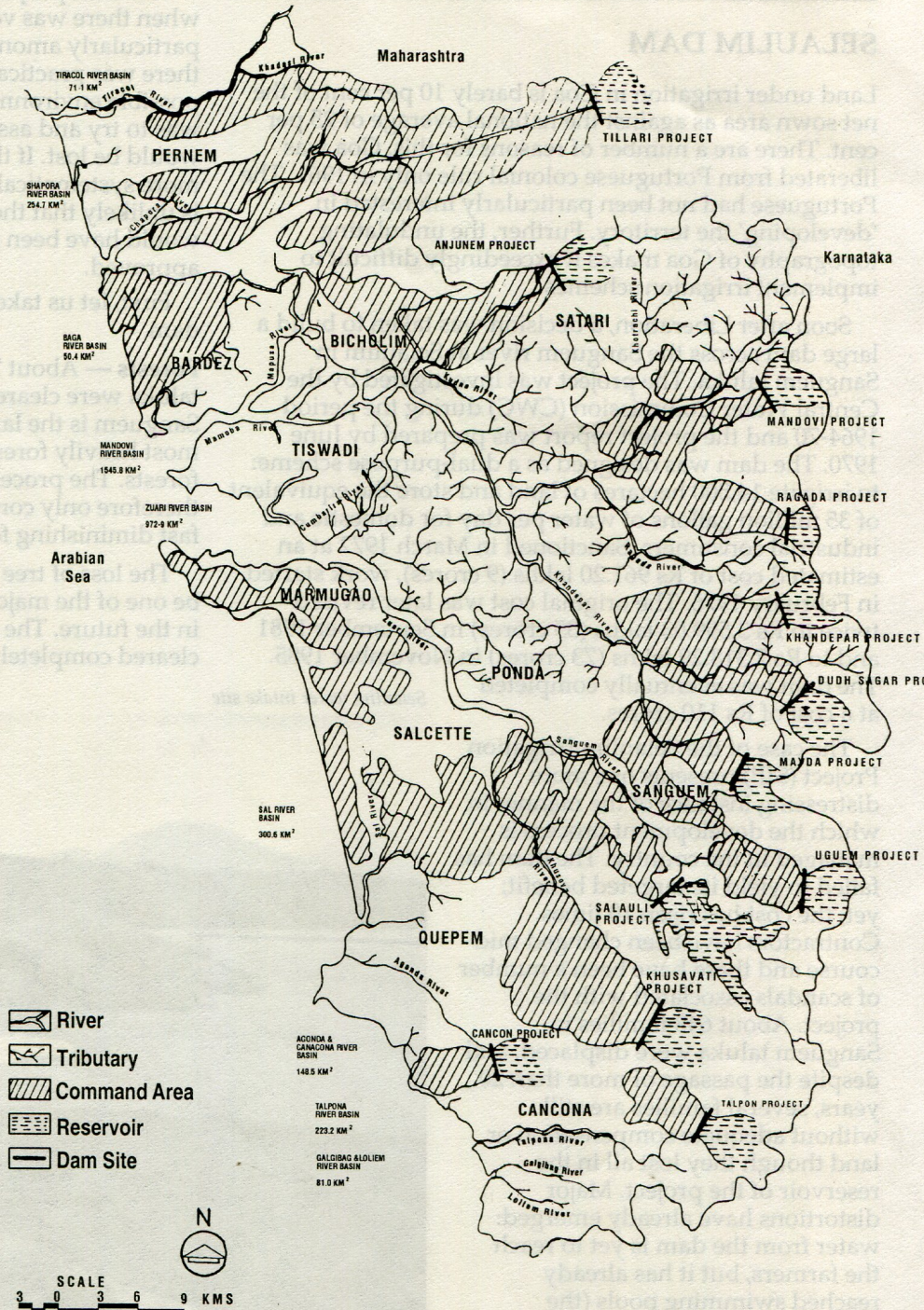
hillocks have been bulldozed and cleared off, and the surrounding forest completely cut down. The forest in these areas consisted of a number of commercially valuable trees like sal, teak, seesam, bamboo and eucalyptus as well as a number of local species like shamb, stham, banyan and various other trees which are useful as firewood.

All this, of course, was in addition to the forest that was submerged, which was 706 hectares in extent. The devastation wrought by the loss of such a large area of forest is incalculable. Quite apart from the sheer economic loss there was a massive loss in terms of ecosystem disruption. Besides, the forest area constituted an important part of the life of the people of Sanguem, and such wanton destruction severed the organic link they had built up with the forest. People were dependent on the forest for firewood, natural produce and wildlife. All this was now eroded. Even if the SIP had included these losses in its balance sheets (which it didn't), the cost has actually been paid by the public at large.

While nearly 706 hectares of forest have been lost due to submergence, there is no plan for compensatory afforestation. According to recent guidelines by the Ministry of Environment and Forests, Government of India, compensatory afforestation should be done in a non-forest area equivalent to that lost in submergence in the dam reservoir and where there is no non-forest land available, the compensatory afforestation has to be double the area that has been submerged (on forest land). The Selaulim dam was sanctioned much before the recent Forest Conservation Act came into being. So the government said it was not bound to undertake compensatory afforestation.

Our enquiries, in March 1990, revealed that the request for environmental clearance in 1988 had been rejected on the grounds that asking for environmental clearance at this late stage was totally meaningless and invalid, as 75 per cent of the project work had already been completed. Thus the Selaulim project has no environmental clearance.

As for the 'catchment area treatment', the Conservator of Forests informed us that the work had been taken up under the Western Ghats Development Scheme. Around Rs 30 lakhs was given as annual grant to the Forest Department for this work. Catchment treatment of 600 hectares was taken up initially and about 1800 hectares was to be treated in the next couple of years. The forest is poorly stocked. Soil conservation measures including



terracing, bunding and contour trenching are being taken up in the catchment areas of both Anjunem and Selaulim dams. Nearly 10,000 hectares of catchment will be treated thus, at least on paper.

More than 60 per cent of Goa's mines are located in Sanguem taluka with rich deposits of iron and manganese ore. The iron ore is of very high quality, varying from 56 to 62 per cent.

The cessation of mining activities has ensured that a large amount of slimes have been left unattended and are now contaminating the reservoir. The roots and other organic matters of the forest that has been destroyed are also playing havoc with the quality of the water. The people of Salcete have never concerned themselves with the problems of the people who were displaced to create the Selaulim dam and which now supplies water to

Salcete and Mormugao. But since there is no such thing as a free lunch, they are having to pay some price in the form of reduced supplies, largely due to the choking of the filters at the Selaulim Water Works.

Wildlife — The fast dwindling forest cover has also resulted in widespread depletion of wildlife in the region. The first problem was the mining, coupled with an increasing human and cattle population which put the forests and the wildlife under great pressure. This process is now being completed by the SIP. The large scale clearing process has exposed the wild species to extensive human influence. The remaining forest in Sanguem is completely devoid of wildlife. Different types of birds like pigeons, parrots, peacocks, etc. have become totally scarce. Earlier, deer and boar were quite abundant and it is believed that till the late nineteenth century, tigers were to be found in the Sanguem forests. Today all these species have fled or been wiped out.

Soil Erosion and Siltation — The depletion of forest cover coupled with the construction of the dam and large scale mining activities has resulted in considerable soil erosion. There is now no tree cover left and the hillocks are rapidly crumbling. The fertile soil of the surrounding fields is being steadily degraded as a result of the exploitation of forest resources.

One of the biggest threats to the dam is siltation. The introduction of extensive agriculture in the catchment area has led to severe soil erosion, which in turn has started the process of silting up the reservoir. Unless a determined effort is made at 'catchment area treatment', the dam is likely to be silted up within 50 years, and not 100 years as claimed by the Project Authorities.

Rehabilitation of Dam Oustees — Due to implementation of the Selaulim Irrigation Project (SIP), land measuring 2604 hectares spread over nine villages was submerged, necessitating the relocation of 643 families.

The number of families affected in each of the nine villages is shown in the table above.

About 550 families opted for rehabilitation. These families were rehabilitated at two sites, viz. Valkinim (140 families), and Vaddem (410 families). Later 36 more families were included in the list of the oustees as they were indirectly affected by the dam reservoir—the approach road to their settlement was submerged.

Vaddem is located at the extreme south of Sanguem taluka and is surrounded by thick forest with economically valuable trees and large plantations of cashew, coconut, and sugarcane.

The approximate area of the Vaddem rehabilitation site is six sq kms. The site is divided into three colonies and is very close to a number of mining areas.

The only physical features which protect the Vaddem people from mining pollution are the hillocks scattered to the north and east. Vaddem is 30 kms from the Sanguem market, Valkinim is about 16 kms from Selaulim dam site. This remote site surrounded by hills, measures 1.5 kms in length and about one km in breadth. Both the sites are divided into three colonies.

At both these locations the following common amenities are provided: drinking water, school building, market, community centre, place of worship, graveyard, internal roads in the colony, approach road to the colony

and lift irrigation facility.

Besides these common facilities, the following amenities are provided to each affected family:

1. One hectare of agricultural plot with irrigation facility;
2. 400 sq kms of housing plot;
3. Rs 13,000 as loan with simple interest @ 6.25 per cent repayable in 17 yearly installments;
4. Free licence for house construction;
5. 16 coconut trees @ Rs 20/- per tree for making rafters;
6. 1.06 m3 of timber @ upset price of Rs 850/- to 1750 per cu m;
7. Free water for drinking as well as for house construction.
8. 75 bags of cement at levy rate. Any extra cement required at market rate;
9. Electric power line upto the housing plot;
10. The affected families were allowed to take the dismantled materials from their houses before submergence and free transportation of these to the respective rehabilitation colonies was provided.

Problems of Rehabilitation of Selaulim Dam Oustees:

Some Observations — We had an opportunity to talk to the oustees of Curdi village, most of whom have resettled in Valkinim, particularly in Colony III. As it was a group discussion in which a sort of consensus opinion of the participants emerged, there was little scope in such discussion of anyone trying to tell lies in the presence of other oustees as everybody knew everybody. In the meeting at Valkinim, a Junior Engineer was present while the meeting at Vaddem was attended by the Superintending Engineer and two officers in charge of rehabilitation, who admitted that the same problems were there in other colonies. Now let us try to see the facts in the light of what the officials and the people say about the problems faced by the oustees.

The complaint regarding the land not being good for cultivation is true and for the majority of the settlers the situation is really bad because the agricultural produce is not enough to survive through the year and they have no other source to supplement their meagre income from land.

Even if the soil were good, there was inadequate water for irrigation or it was not possible to irrigate as the water bearing channels were at a level lower than the fields.

Besides, the agricultural land allotted to each family was only one hectare which was inadequate to support an average family of five members. It is generally accepted and followed in principle in most other Indian states that minimum two hectares of land are necessary for a family.

Even then, the officers boast that 'this is the best rehabilitation project in the country.'

Though the members of the families affected by the dam submergence are supposed to get preference in jobs, in practice very few are able to get a job even if they are educated and possess skills. Quite a few women complained that while there was very little income from land, they had no other work. These included a handicapped

educated girl and a few widows, all displaced from Curdi village and now living in Colony number III of Valkinim.

The oustees had other sources of income in their previous habitat, such as trees (including cashew, coconut and mango) and cattle. While they have lost their trees, they had to sell their cattle as there was no provision for shelter and fodder for the animals in the new place. The compensation received cannot be substituted for the regular income derived earlier from the said sources.

The rehabilitation committee meetings are regularly held, attended by the engineers concerned and officers in charge of rehabilitation including Land Acquisition Officer and Estate Officer, often presided over by the Chief Minister himself. The representatives from different rehabilitation colonies of both Valkinim and Vaddem are present in the meetings. But in such meetings, usually it is the comparatively better off, educated, more articulate ones who came forward with their problems and demands. On the other hand, the poor, the illiterate among the oustees, even if aware of these meetings, are too busy with their daily struggle to find time to attend these. Even if they come to these meetings they have either no courage to narrate their grievances and articulate their needs nor do they get a chance to speak about their problems. Moreover, the so-called people's representatives are often not bothered about the poor folk.

Suggestions — In the light of the problem of the displaced people of Selaulim, as narrated by the oustees themselves and admitted even by the officials, we may offer the following suggestions which may be taken into consideration while implementing the rehabilitation scheme.

1. The one hectare plot of land given to each of the oustee families is not adequate. It is now an accepted norm to give minimum two hectares (five acres) of land to each family which is to be rehabilitated. This is the norm accepted even by international agencies in the Third World countries and has legal sanction, as for instance the recommendations given in the Narmada

Dispute Tribunal Award. So the minimum land given to an average family of five should be two hectares.

2. It is noticed that the land is usually given to the family as a unit. This creates a problem where joint ownership of landed property exists. When the sons/daughters become major, get married and have their own families they face the problem of earning their livelihood. As they are also part of the affected population, each of the major sons/daughters have to get land which is essential for survival.

As mentioned above, the Estate Officer received complaints where the person who was allotted land for agriculture and house plot did not allow other major family members to share what he got. Even if he shared the land or house with other family members (say, his younger brothers) there will not be enough for all and this will only result in fragmentation of already inadequate agricultural land or further partition of a small house. This will not solve the problem. So it is suggested that each major member of the family should be taken as a unit and given separate land to enable each person to have an adequate source of livelihood. In fact, this is one of the demands of the Maharashtra oustees of Sardar Sarovar Project.

The fact that the government is giving them a loan of Rs 13,000 with annual interest @ 6.25 per cent is itself recognition of the fact that the money people got as compensation for the house/land lost was not enough for constructing a house in the new place of resettlement. Many have spent their savings in building the house. It is a matter of shame that even for this inadequate amount given as loan, the government, in true *bania* tradition, is charging yearly interest @ 6.25 per cent. Why can't the money be given as a grant for construction of a house to the oustees who have been forced to leave their homes and lands in the name of 'National Interest' and 'Development'.

The size of land to be given to each family should be determined by the number of persons in that family, so that a larger family should also get a larger share in the agricultural land. Alternatively, the major sons/daughters in the family should receive land separately.

Those who have not got good land should be given better land elsewhere. If land suitable for cultivation is not available near the present

Selaulim Dam reservoir with stumps of trees.



Displacement due to Selaulim Dam

Village	No. of families displaced
Vichundrem	18
Curpem	104
Naiquinim	18
Pottem	74
Curdi	344
Undorna	21
Selpem	25
Selaulim	34
Uguem	5
Total	643

rehabilitation sites, the oustees could be given land in the command areas. Likewise, those who do not have irrigation facilities could also be given irrigated land in the command area, where land could be obtained for the purpose from those land owners who have surplus land.

For the present and future projects which are undertaken in the name of welfare of the people, the authorities should consult the people first, both in the command area as well as in the area to be submerged. In fact there should be a public debate over the pros and cons of the project, and benefits as well as losses. In particular, adverse social and environmental effects of the scheme should be explained to the people. All information relating to the project should be made public to enable the people to decide in favour of or against the project.

For instance, in the case of SIP, if people had been consulted, they might have refused the dam and even suggested alternatives. It is already noted that not many farmers are coming forward to take advantage of irrigation. You cannot just force people to take water and grow crops other than what they were traditionally growing according to their needs just because you have brought irrigation, where it was probably not needed in the first place.

The engineers should first study the various alternative schemes and then select the best scheme which will give maximum socioeconomic benefits with the least destruction in the form of submergence of agricultural land and forest and minimum suffering to the people by way of displacement. Unfortunately, by alternatives the engineers only understand the alternative site of the same scheme and not the alternatives to the scheme itself. Moreover, by training and motivation, they are only concerned with constructing the wall of the dam and are not bothered about either environmental loss or the social cost in the form of human suffering. These attitudes have to go. Such change could be brought in the first place by including studies on the social and environmental aspects of the major projects in their curriculum itself. The involvement of sociologists, anthropologists and environmentalists in the planning of the projects could also be useful.

It should be realised that the case of the oustees is to be treated as a special case. The people have been uprooted for no fault of their own and in fact they have sacrificed their lands for the benefit of those in the command area. So the officers should not imagine that they are bestowing favours to the oustees. In fact, we should be grateful that the people have agreed to leave their hearths and homes, their forests and fields, and familiar environment and to go and live in unfamiliar surroundings and risk hardships and an uncertain future. It is their right to get the best facilities so that their quality of life is even better than that in their previous place.

As for the people of Salcete, it is important that they realise that the Selaulim water which they now use is not only contaminated with metals in excess of the limits laid down for pure drinking water, but it also comes with the unwashable stain of not just uprooting several hundred families to make way for the dam, but of not bothering in even small ways to ensure that government compensated these victims with dignity, concern and adequate compensation packages.

Ramesh Billorey

THE TILLARI DAM

The Tillari Irrigation Project was initiated in November 1965, during the regime of the first Chief Minister of Goa, Dayanand Bandodkar. Goa is yet to receive any water from the dam in 2002!

The previous site for submergence was at Parma, in Sindhudurg district. It involved 4430 hectares of land from 13 villages in Sawantwadi taluka of Maharashtra. The site for submergence was later changed to Tillariwadi, since at this location it would submerge only 1980 hectares and affect 7 villages.

The site of the dam is at upper Tillariwadi at the confluence of the Tillari river with Kharari Nallah. The Tillari Irrigation Project (TIP) involves construction of a dam 900 m in length and 71.35 m in height with the capacity to impound 460 million cubic meters of water. Goa is investing 15 per cent of the cost of the TIP with Maharashtra supplying the rest.

The project though located in Maharashtra is supposed to benefit Goa more than it does Maharashtra. Goa, as a result, is going to foot three-fourths of the cost for the head works. This combined with the cost of the two main canals and other downstream distributaries will cost Goa almost Rs 500 crores when completed in another 5 years.

The Tillari project consists of the Tillari Left Bank Canal (TLBC) and the Tillari Right Bank Canal (TRBC). The TLBC takes off from the irrigation cum power outlet tunnel (ICPO), after 10 megawatts power has been generated and utilised by the Maharashtra Government. In similar fashion, the TRBC would utilise the released water from the Tillari hydro-electric project and further generate 200 kilowatts of electricity at the foot of Terwanmendhe. The tailrace water (effluents) from this power house would be used to feed water into the TRBC.

The TLBC bifurcates into two canals after it takes off from ICPO and enters the village of Perma. At Perma, one branch of the TLBC joins the TRBC and is called the 'Link Canal' covering a distance of 4 kms. The TLBC main branch covers a total distance of about 80, km of which 38 kilometers are in Goa. Its total command area is 11,970 hectares in Bicholim and Bardez.

The TLBC subdivides into the Sanquelim branch canal which is 14 km in length and the Siolim, Sal and Vadaval distributaries which are 5 km, 5 km and 6 km in length respectively. The Sanquelim branch would have 3400 hectares under its command in Bicholim taluka and the Sal and the Vadaval distributors would cover 6000 hectares, mainly in Bardez taluka.

The villages of Revora, Tivim, Siolim, Anjuna, Bastora, Candolim, Calangute and Nerul are covered by the Sal distributary. The Sanquelim main canal is projected to cover about 5500 hectares in its command area which includes the villages of Mulgao, Mayem, Pilgao, Sirigao, Bicholim and Vaguinim.

The Tillari Right Bank Canal (TRBC) has a length of 24 kms in Goa, with 6 km being the common length between Maharashtra and Goa. The total area under its command would be 5000 hectares and it would have 2 distributaries called B1 and B2. These would essentially cover villages in Pernem taluka before crossing the Maharashtra border and later serving the Banda region of Sawantwadi taluka

in Maharashtra. The villages covered by the TRBC in Goa would be Parsem, Torshem, Mopa, Ibrampur and Pernem.

The dam has been delayed for many years due to a number of contentious issues. A large population of almost 50,000 people is likely to be affected. A fairly large amount of land is being acquired in both Maharashtra and Goa for the left bank main canal, particularly in the villages of Assonora, Sircaim, Revora, Tivim, Colvale, Siolim and Assagao.

There is huge land acquisition past, present and future for the RBMC, LBMC and other distributaries. Like in the case of the Narmada Project, we will not be surprised if this land acquired is more than the land to be irrigated.

Maharashtra has insisted that not only should 50 per cent of the displaced persons be relocated in Goa (about 25,000 people), but that they should be given priority in employment. These conditions which one would have imagined to be unacceptable to the Goa Government proved not to be so during the brief tenure of Mr. Churchill Alemao as Chief Minister. He wished to achieve something spectacular during his brief tenure. Without any preparation whatsoever, or even a bare understanding of the problems involved, Mr. Alemao flew down to Mumbai and signed an agreement with the Maharashtra Government, practically conceding that government's demands. The agreement stipulates that 600 hectares will be set aside for the displaced persons in Bicholim and Pernem in the command area of the dam. The rehabilitated persons would also be given priority for employment in Goa, even while the rehabilitation process would be effectively overseen by the Maharashtra Rehabilitation Centre. Goa would pay the cost of rehabilitation. Maharashtra would concentrate on the execution!

This is not the only problem with the project. The basic assumptions underlying Goa's involvement in the project are faulty. In fact, it would appear that cropping patterns which have stood the test of time are to be changed merely to justify the project.

It is clearly evident from the project report that the existing cashew plantations are to be replaced by crops such as groundnuts, bananas and vegetables merely to give credibility to the TIP by their demand for the water under the command area irrigation scheme. In the eyes of our planners, the fact that cashew does not require much water, rather than being a virtue, is to become the cause of its extermination!

The TIP proposes to convert Bardez, Pernem and Bicholim talukas into the 'grain basket' of Goa with emphasis also given to horticulture, floriculture and vegetable farms. However, a glance at the regional developmental plans shows that they are at cross purposes with agricultural development.

It is a sad reality that Rs 525 crore invested on the grand Tillari Irrigation Scheme would soon turn into a dead investment as most of the 16978 hectares proposed to be covered under the TIP would either be converted into concrete jungles or completely destroyed by the mining activities. It appears unlikely that there would be any land left for irrigation by the time TIP is completed! Given the rate at which the TIP is progressing it seems likely that it would commence only after the tourism policy of the Goa Government has covered Bardez taluka with concrete jungles, the lack of industrial foresight has

destroyed Bicholim taluka with heaps of mining rejects and the Goa Government's incompetence has turned the rich cashew plantations of Pernem into a fragile capital intensive agricultural economy.

It is claimed that the dam, which has a catchment area of 302 sq km, would annually utilise about 530 million cubic meter of water, of which about 60 million cubic meters would be used for industrial purposes. But given that there is unlikely to be sufficient agricultural activity to utilise the water, most of the water produced by the TIP, although earmarked for irrigation, would be diverted for alternate uses: industries like Meta Strips that gobble up millions of litres per day; 9-hole golf courses that need 3 million litres a day, etc.

The Environment Impact Assessment (EIA) of the Tillari project carried out by Kirloskar Consultants in association with Mechatronics Systems Pvt Ltd., Pune, covers the 20 km radius around the dam site at Tillari but totally ignores the enormous damage which would be done to the coastal vegetation around river Chapora as well as to the flow and the health of River Chapora itself.

The irresponsibility of the government is evident from the fact that no environment impact assessment has been carried out by the Goa Government, as has been done by the Maharashtra Government. Goan citizens, in fact, refused to participate in a public hearing on the project since the hearing was coming too late in the day.

While it is doubtful that Goa has the agricultural capacity to utilise Tillari water for irrigation, the TIP instead of helping the Goan economy would adversely affect the lives of the fishing communities in Bardez and Pernem talukas of Goa. Goans must realise that the waters impounded for the TIP would adversely affect the flow of the Chapora river downstream. Due to lower availability of fresh water downstream, as a result of the diversion of water into the dam, the salt water from the sea would ingress further upstream. This would adversely affect biodiversity as well as the fresh water aquaculture carried out by Goans.

Considerable damage is likely to the living conditions of the people living on the banks of the river Chapora, as a vital source of food in the form of fish, shellfish and crabs would be endangered. Further, mangrove vegetation and other flora would suffer as the water meant for River Chapora would find its way into the right and the left bank canals of the TIP and flow into the concrete jungles around Calangute and Candolim, or be lost into the mining reject pits around Bicholim!

In north Goa, water from rivers in the hinterland is being pumped at great cost to the coastal belt for the benefit of the tourist belt. Initially, the PWD pumped water out of the Assonora river. When the river showed signs of rapid depletion, the PWD started pumping water from the Amthane river to replenish the Assonora river. Talk about robbing Peter to pay Paul to satisfy John. In the case of Tillari, most of the adverse environmental impacts will naturally be felt in Maharashtra since the head works are located there. This is a typical example of a project in which one set of people is promised the benefits without asking for them, while another set pays a price totally disproportionate to the benefits received. And this kind of ad-hocism is called water management.

Joe D'Souza

MEDIUM SIZED DAMS

The Amthane Irrigation Project (AIP) — located in Amthane village (Bicholim taluka) was initiated in the early 1980s (around 1982) to augment the supply of water for irrigation in neighbouring areas, for example, Pirna village. It is situated in the valley, with heavily forested hills in its vicinity, about half an hour's walk from a junction along the Pirna-Mencurem road. The road to the site is recently built with laterite stones and mud and bypasses two quarries, one for laterite stones and another for mud and the plateau area with magnificent cashew trees where a golf course was unsuccessfully proposed. The local panchayat is in charge of this village of about 10 houses in Mencurem. The land was purchased from the Rane family around 20 years ago.

Houses in this village are of simple construction, and the people are predominantly farmers and horticulturists, and breed cattle. It is a self-reliant village, with a local temple, clean source of water supply that now faces catastrophe due to the careless building of the AIP by the PWD authorities.

Looking over the reservoir of the project, to the left bank one notices heavily forested hillsides with cashew and local trees; human habitation interspersed with village/individual orchards, gardens, a primary school (Std.I - IV), and paddy fields on the lower slopes. The right hand bank is mainly lateritic rock with cashew and shrub vegetation.

The then Chief Minister (Pratapsingh Rao Rane) was instrumental in pushing this project through, but it appears that its original purpose (questionable in the first place)—to supply irrigation water—has now been sidelined. The water is now supplied to the Assonora water works. A meagre supply flows through an open channel, partially completed, through Pirna village.

The region occupied by the waters of the reservoir was a highly productive area, looked after by the villagers with care as can be from the destruction done to this area. Around 1000 fruit bearing coconut trees; 2000-3000 coconut saplings; 200-300 cashew trees and many other local species have been cut. Fifteen houses have been affected by the rising waters with three houses in the area submerged. A number of paddy fields have been irreversibly lost, one producing over 25 *khandis* of paddy. Local youth who were gainfully employed now face the prospect of starvation; one youth had taken a loan of over Rs 25,000 to purchase four hybrid cows.

It is clear from these observations, that this village, hitherto self-reliant, will soon be a victim of this criminal project, and cease to exist with the rising waters of the reservoir.

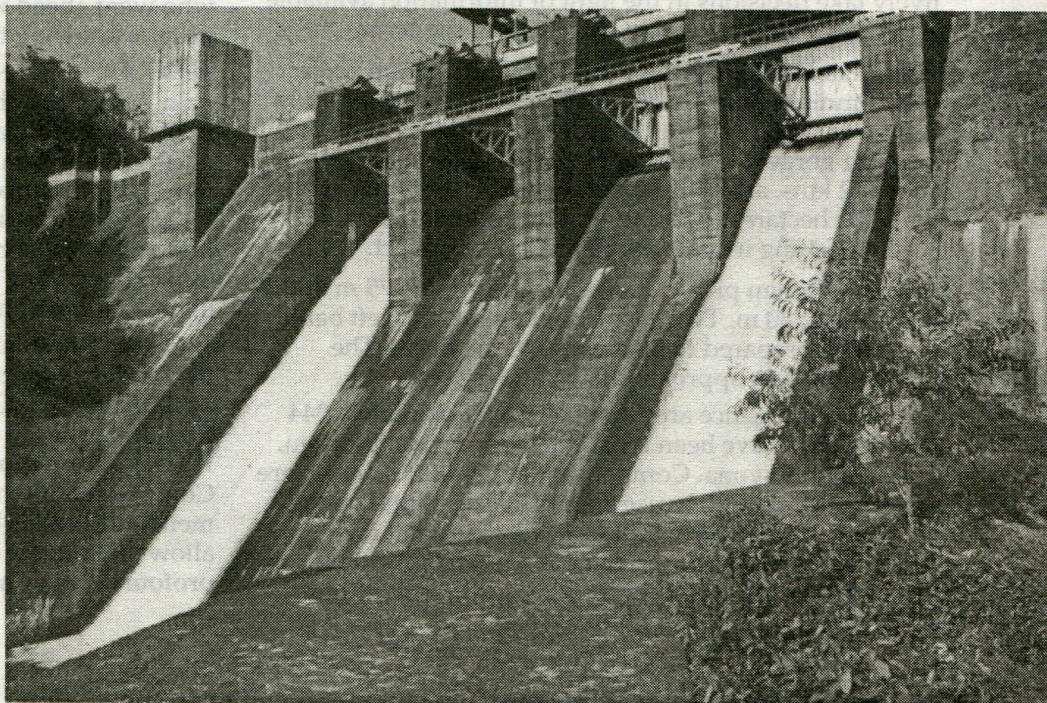
In the initial phases of the project the locals had requested that:

- i. water supply be made available to the villagers;
- ii. a road be built;
- iii. services/jobs be provided;
- iv. a lift irrigation scheme with storage tanks be installed.

These demands have been met with official apathy. Two wells have been provided by the RDA, which at the time of visiting were bone dry; and a tube well provided water, unfit for drinking purposes. There is no water supply to the villagers, despite the fact that they are less than 300 m from the reservoir's edge. A fencing is proposed to prevent them from bringing cattle to drink water.

Even a couple of years after this project has been inaugurated we have seen tree stumps rising from the reservoir; plenty of clear-felling along the right hand bank near the tree-water line; submergence of agricultural fields, long looked after and carefully terraced and manured with ash and local organic fertilisers; extensive

Anjunem Dam spillway



erosion of mud along the left bank reducing reservoir capacity and no embankment consolidation measures.

That the government is least interested in addressing itself to the genuine concerns of the people is clear from this project. Valuable productive land has been lost, and people are being asked to sell their land for a pittance (Rs 0.75-1.00 per sq m). The greatest tragedy is that during the monsoons, once the reservoir fills up, it presents a frightful nightmare to the villagers.

If the government fails to excavate mud from the left bank of the reservoir to increase its storage capacity, as well as stabilise the banks, it is clear that Amthane village will disappear under the rising waters of the reservoir. Irrigation department officials prefer that villagers should

sell their land for a pittance, and relocate, rather than take measures so that the people of this village could live in peace.

It is also clear that during the month of October when the reservoir fills up, the water enters into paddy fields, fish destroy the paddy crop and coconut trees beyond the boundary mark are submerged to a depth of about five metres. That the waters have reached near the basement of houses and the village temple is a clear indication of the catastrophe that lies ahead.

The AIP originally envisaged for irrigation purposes is now diverted towards water supply for domestic use. The Tourism Department had also proposed that the water be diverted towards the proposed golf course on the plateau for which the government intended to acquire 4,92,400 sq m of comunidade land.

All things in this area point towards a criminal conspiracy by the government in collaboration with local authorities and certain vested interests, to destroy the livelihood, way of life, and resource base of the people who inhabit these areas.

The choice before us all is clear: villagers and panchayat authorities should not accept the arguments put forward by these vested interests, but should collectively take decisions in the light of information available to protect the resources and interests of the community.

Anjunem Dam — This medium-scale irrigation project was commenced in February 1977 and is by now nearly complete. The dam is located at the upstream end of a 1.5 km long gorge of the Guluneni nallah (Costinadi) and is about 12 kms. away from Sanquelim. Twenty per cent of the 2,100 hectares in Sattari and Bicholim talukas are already getting irrigated water from the project.

The Anjunem project has a crest length of 175 m and a height of 42.80 m. Two canals, right bank and left bank have been prepared to lead water to the fields. The project cost was approximately 22.33 crores.

The submergence area displaced approximately 344 families who have been rehabilitated in Onda, Morlem, Poriem and Ravona. Compensation included one hectare of agricultural land, house sites of 400 sq m and costs of Rs 13,000. Goa government officials claim that the Anjunem rehabilitation scheme is a model scheme for the rest of the country. However, other governments offer much more.

No report is available till today on the environmental impact of the dam including siltation rate and possible water logging and salinity effects in the command areas, most of which already have a high water table.

Mandovi Dam — The Mandovi Dam proposed to be constructed across the River Nanoda, a tributary of the Madei River in Sattari, has died a natural death after the Goa Government was denied permission to destroy over 350 hectares of forest in the submergence zone by the Ministry of Environment and Forests.

The storage capacity of the dam was 112 mcm of water and the command area 5,902 hectares. Without waiting for the required permission under the Forest Conservation Act 1980, the Goa Government went ahead with work on the dam. It acquired a total of 1,70,070 sq m on which it spent Rs 4,55,878 as compensation.

In addition, the government constructed various residential and nonresidential buildings, including storage sheds, an approach road to the dam site and even a helipad.

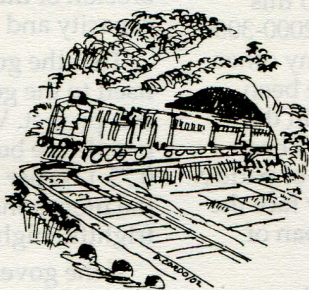
In all the government spent a total of Rs 210.96 lakhs on the project before it was rejected by the Ministry of Environment and Forests. As this amount is now waste it should be recovered for the salaries of all these officials who went ahead with the construction of the project despite knowing that prior permission was mandatory under the Forest Conservation Act 1980.

In April 2002, the government announced that it was now considering a set of smaller dams to generate a total of 60 MW for Goa's power needs. Government was opting for the smaller dams because it had to see that no forests would be submerged. The surveys in this connection are yet to start. Goa has surplus power and sells it to other states. Why it should want to pulverise the Madei in new, unheard of ways, is beyond anyone's guess.

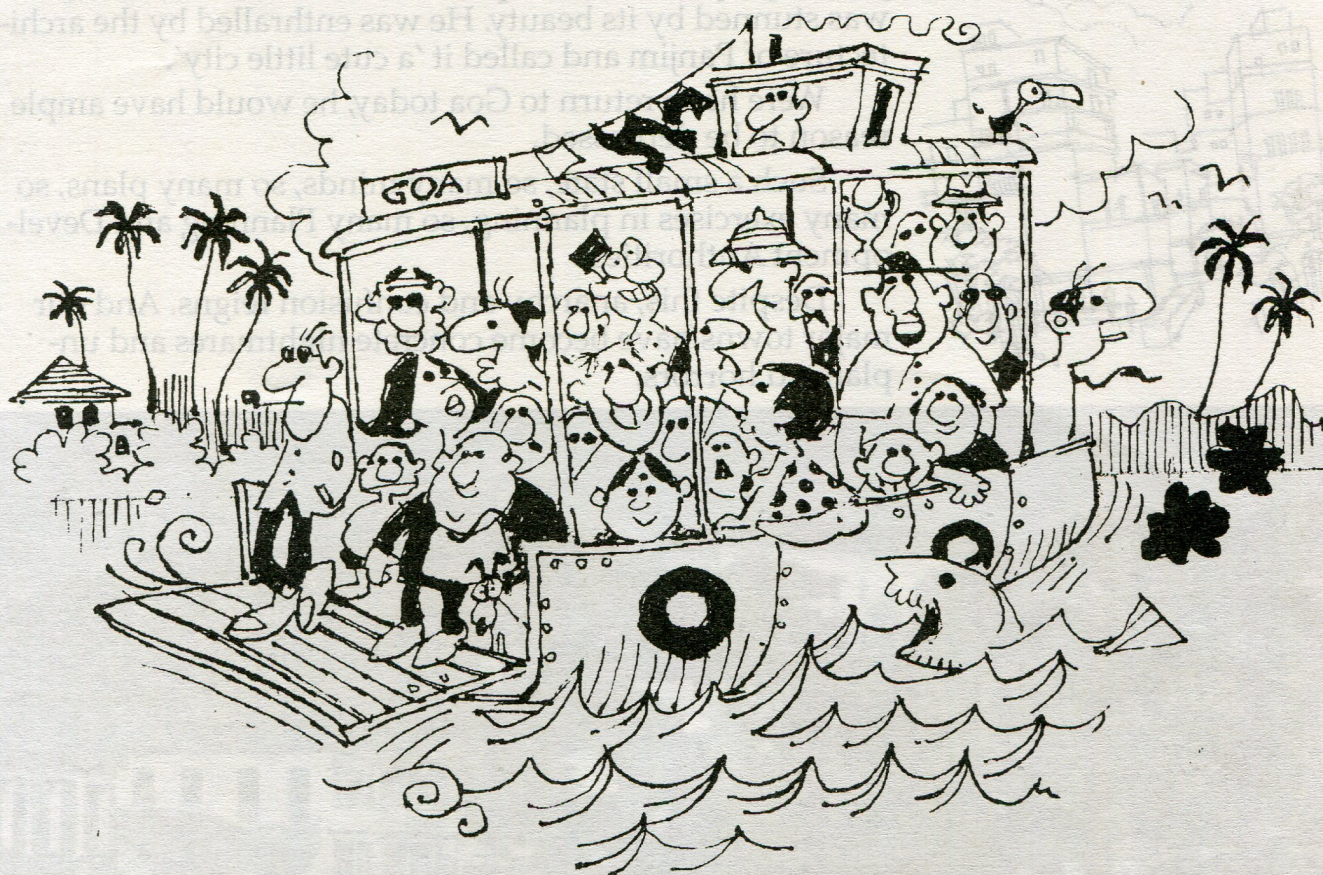
On the Karnataka proposal to divert the tributaries of the Madei to supply water to the Malaprabha, so far it appears the Goa Government has been standing quite firm. It has raised an interstate dispute with the Central Water Commission and a stay has been granted by the Commission on the diversion. The Ministry of Environment and Forests has already indicated that it will not allow any project on the Madei as this would have profound impacts on Goa's Mandovi river, its lifeline.

Areas of Reservoirs in sq kms.

Large	Selaulim	12.695
Medium	Anjunem	2.325
Minor	Amthane	0.7
	Maishal	0.3



Tailpiece: Ferry Crossing



Of the myriad joys of Goa, one of the best is the ferry ride. It comes as a welcome change from jolting trips over potholed roads, badly maintained buses, rude conductors and overpriced taxis. In fact, the ferry is considered by many as representative of Goa itself: not for nothing did Penguin India choose to title its collection of Goan short stories *Ferry Crossing*.

Broken up as it is by a number of rivers and estuaries, and with islands in midstream, the ferry plays an essential role in maintaining communication and transport links in Goa. The figures speak for themselves: there are a total of 22 ferry points in Goa; the Mandovi river has 13, the Zuari 4, the Chapora 2, the Tiracol 2 and the Sal 1. A total of 9211071 passengers trips were made by ferry in 1996-97. This accounts only for those who paid: ticketless travel is rife, and ferry conductors are known to pocket fares.

Ferries carry anything—from single passengers to trucks. The fares are reasonable, due to considerable subsidies from the government. Passengers now travel free, bicycles cost Rs 2, a motorcycle Rs 4 and a car Rs 7. This appears to be loaded in favour of cars as the weight and space occupied by a car is considerably more than that required for 2 motorcycles or 7 passengers. If you need to hire a special ferry (apart from the scheduled times) due to some emergency, this facility is available at Rs 55.

Given the propensity of Goan bridges to keep falling down, it is just as well that the ferry is there—for many years in the eighties, getting to

Panjim from the north of Goa involved a longish ferry ride. The long wait for a bridge across the Zuari came to an end in the 80s, but some years later, passengers returned in patient resignation to the ferries when the bridge was declared unsafe.

There is something about crossing a river in a ferry that can never be matched by driving across it on a bridge. As the ferry makes its leisurely way across the river, you are transported back to another time. It can be exquisitely romantic crossing over on a moonlit night.

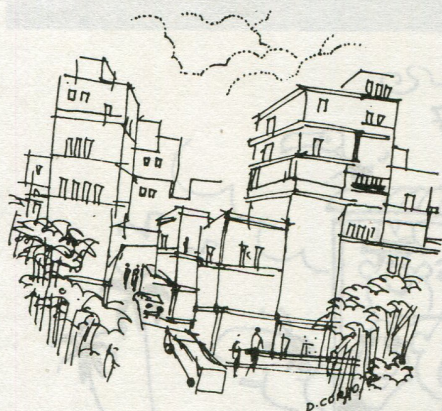
The ferry seems to have been caught in a kind of time warp, where life is somehow gentler. This is evident in the dreamy look in the eyes of passengers and expression of small courtesies, which have died out of our alienated urban-industrial life-style. For example, at some ferry points, a ferry which has just set off actually returns if it sees a passenger frantically running to get there in time, thus saving him a longish wait.

Of course, this kind of courtesy is characteristic of only the smaller ferries—if you travel across the Chapora river at Siolim-Chopdem, or cross over to Chorao from Ribandar, you will confront the same tense, aggressive, knuckle-biting attitudes as in our larger urban centres. And let us not forget that while the ferry crossing may be a pleasant interlude for some, for many it is a twice-daily chore. There are many problems to make frustration levels rise. The ferries are old clunkers, emanating foul diesel fumes. The lack of covered space can make the crossing on a sunlit or rainy

day quite painful. And the ferries keep breaking down. One recently overturned because it was overloaded. At places which are serviced by only one ferry, missing it means either cancelling your trip or submitting to the extortionate demands of canoe owners for a ride across. The canoes take only passengers, of course, not their vehicles. A replacement ferry takes hours to arrive, and on some of the islands this can be a major inconvenience as there is no way one can get across.

At the ferry points with a high passenger load, there are often too few ferries to meet the demand. This leads to long waits, overcrowding and frayed tempers. These tempers can spill over into violence as happened at Ribandar where a frustrated mob set fire to a ferry and beat up some of the staff. The worst bottleneck is at the Siolim-Chopdem ferry, where the ride itself takes 20 minutes, apart from the wait due to the shortage of ferries. Having finally got on, in close and sweaty togetherness with one's fellow humans, one can admire the foundations of the bridge being constructed across the river, on which no visible progress has been made for years. (Not that it matters much, for it will probably promptly fall down anyway.)

But let us not dwell on these matters. As we said earlier, the ferry ride can be a unique, dreamy, romantic experience ...

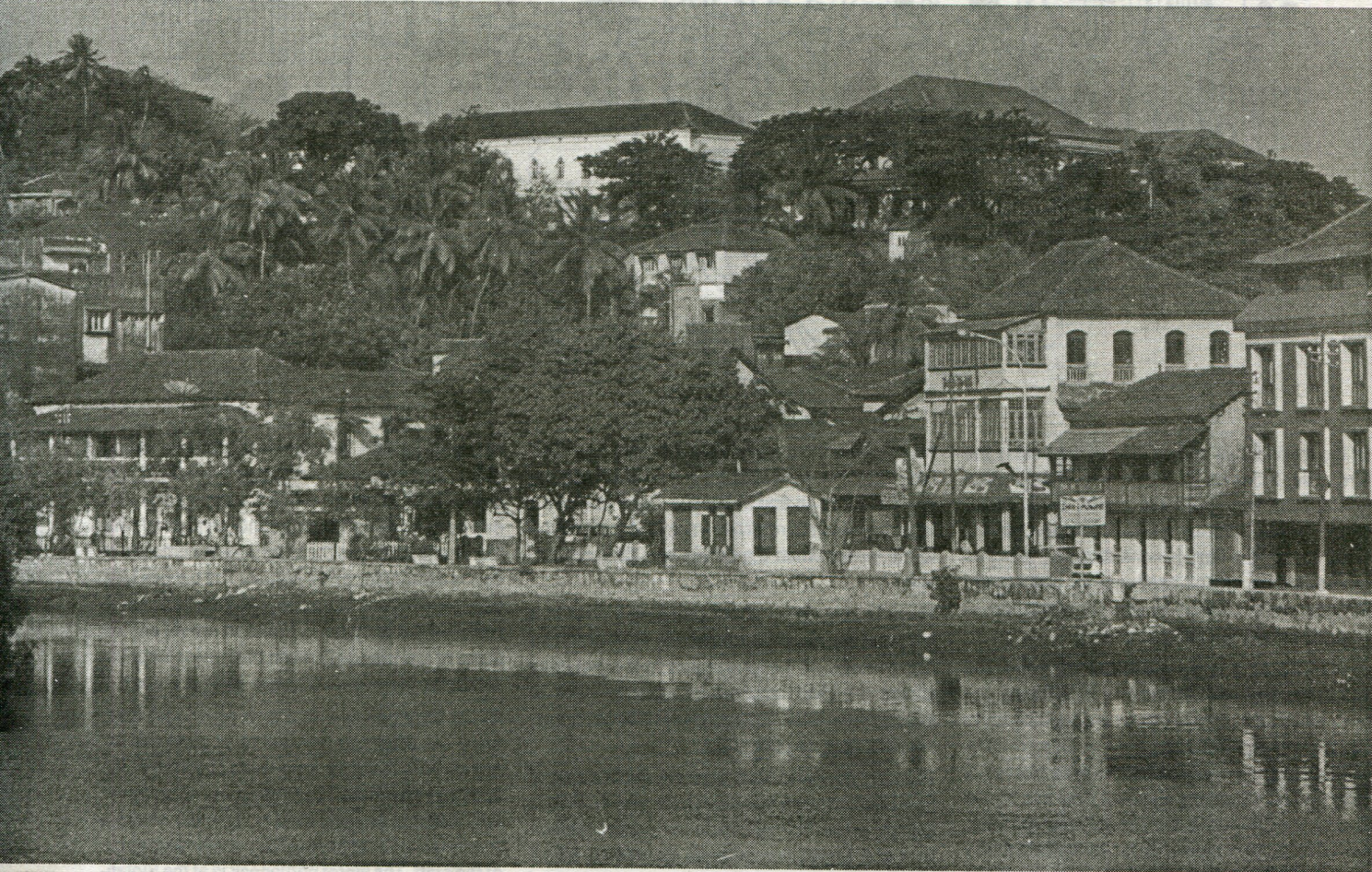


When Swami Vivekananda visited Goa a hundred years ago, prior to his departure for the United States, he was stunned by its beauty. He was enthralled by the architecture of Panjim and called it 'a cute little city'.

Were he to return to Goa today, he would have ample reason to be depressed.

Such a small state, so many minds, so many plans, so many exercises in planning, so many Planning and Development Authorities.

Despite this, anarchy and confusion reigns. And our major towns have become concrete nightmares and unplanned horrors.



Panjim: A cute little city

Land Use Planning

The character of Panjim has been decidedly altered for the worse. The elegant charm of Margao has sunk under the maze of high rise concrete blocks and a nonexistent road system. Politicians find Regional Plans and Outline Development Plans a quick source of ready funds, as vested interests and developers pay the price to get areas freed from planning restraints.

It is the government that has reduced every exercise in planned development to a mockery and a fraud. Harsh words? Not when you review the process of planning and see how it has been misused and bent by the government to serve vested interests. Not content with that, an erstwhile Chief Minister is quoted as having said, 'It is sad that Goa has been unable to produce a single builder who can build a bridge that lasts for more than 15 years.' A pathetic attempt to pass the buck which should have firmly stopped on the table of the Government. Goan professionals of all kinds have displayed their skills and won acclaim all over the world. The Goan politician, on the other hand, is known only for shirking his responsibilities or abetting corruption.

HISTORY OF PLANNING IN GOA

With the idea of planning being introduced in Goa after liberation, the Town and Country Planning Department was set up in December 1964. It was headed by a senior town planner. The main aim of establishing the department was basically to prepare the Regional Plan of Goa and the Master Plans for the rapidly growing coastal towns of Panjim, Vasco-da-Gama, Margao, Mapusa and the interior town of Ponda.

The Building Bye-Laws and Zonal Regulations 1965 was the first work of the department, but their jurisdiction was extended to taluka headquarters which were urban in character, and certain selected villages around these taluka headquarters which also showed signs of developing urban features.

A Town Planning Committee was constituted in order to provide guidance to municipalities since these had no qualified engineers or town planners. The committee also carried out various surveys concerning land use for the important urban centres for which zoning plans were prepared. Thus the zoning plans of Panjim, Margao, Ponda, Valpoi and Pernem were approved by the Town Planning Committee already in 1968-69. Later the same committee approved the zoning plans for Mapusa, Bicholim, Quepem, Sanguem, Vasco-da-Gama and Chaudi. Areas like Taleigao, Caranzalem, Curchorem, Sanvordem and Porvorim also got their zoning plans.

In addition to the zoning plans, the department also prepared a number of schemes for the development of tourism. These included the Colva Beach area, Mapusa terrace garden, Miramar and Calangute beach areas, Mandovi approach road, landscaping of Goa Medical College, and slum clearance schemes for Calicut Road, Panjim and Baina, Vasco-da-Gama.

Shortly thereafter, in 1974, the Goa Assembly approved and passed the Goa, Daman and Diu Town and Country Planning Act.

The Act was notified on November 4, 1975. The legislation is designed to provide for planning the

development and use of rural and urban land in the State. The Act, which came into force in 1976, is largely a copy of the Maharashtra Town & Country Planning Act. (In fact, most of our legislation is generally copied from the law books of the neighbouring state). The Act empowers government to ensure the planned development of the state without compromising natural resources. It led to hopes being raised that development would, in future, take place in a planned and systematic fashion. These hopes turned out to be entirely misplaced.

The Act provides for the appointment of a Chief Town Planner and the Goa Town and Country Planning Board. One of the major functions of the Board is to guide, direct and assist Planning and Development Authorities (PDAs) in their tasks and also to advise the government on planning and development matters.

Under the Act, the Chief Town Planner is required to draw up and prepare a Regional Plan of Goa. The Plan must demarcate, broadly, areas for different human uses, including agriculture, forestry, industry, urban and rural settlements etc. It must also provide for land for recreation, botanical and zoological gardens, natural reserves, animal sanctuaries, sites of historical and archaeological value and so on. In certain parts of the state, areas would be set aside for industrial purposes or town planning schemes. The Act also did not permit any changes to be made in the Regional Plan for a ten year period.

Given the nature of the Regional Plan exercise, mistakes in zoning were bound to occur and several persons found that their settlement areas had been placed in orchard areas or their agricultural areas had been demarcated as orchard zones, etc. These, however, could have been modified without too much of a fuss by adopting suitable procedures.

The Regional Plan of Goa was mostly drafted by town planners Morad Ahmed and D.R. Bhatt. It was notified for public comment in 1982. Town Planners claim that the Regional Plan they drafted was made available in all the taluka headquarters so that people could inspect it and file objections and suggestions. After this so-called public participation exercise, the Plan became law when it was notified in 1986 in the gazette. As per the Act, from the date of the Notification, no development activities may violate the land uses demarcated in the plan.

However, by 1986, when the Plan was notified, a new set of economic interests had set their eyes on Goa. These were led by the tourist lobby which found that the Regional Plan had set aside all the beach areas for purposes of orchard or as green areas. Accordingly, pressures were brought to bear and an amendment hastily moved in the Assembly which empowered the government to forego the ten year restriction and change the Plan as and when it pleased. Thus, hardly had the ink dried on the official gazette, when the first set of Regional Plan changes designed to make way for the Ramada Hotel, the Leela, etc. were notified. Shortly thereafter, Du Pont decided to erect its Nylon 6,6 factory at Savoi-Verem and the Government agreed to allow land use changes to permit the Du Pont project too.

Within the short span of ten years after the regional plan was notified, the Government itself was forced to concede that the plan had been modified more than a thousand times to suit either this party or that, with the result that much of the development that has come up

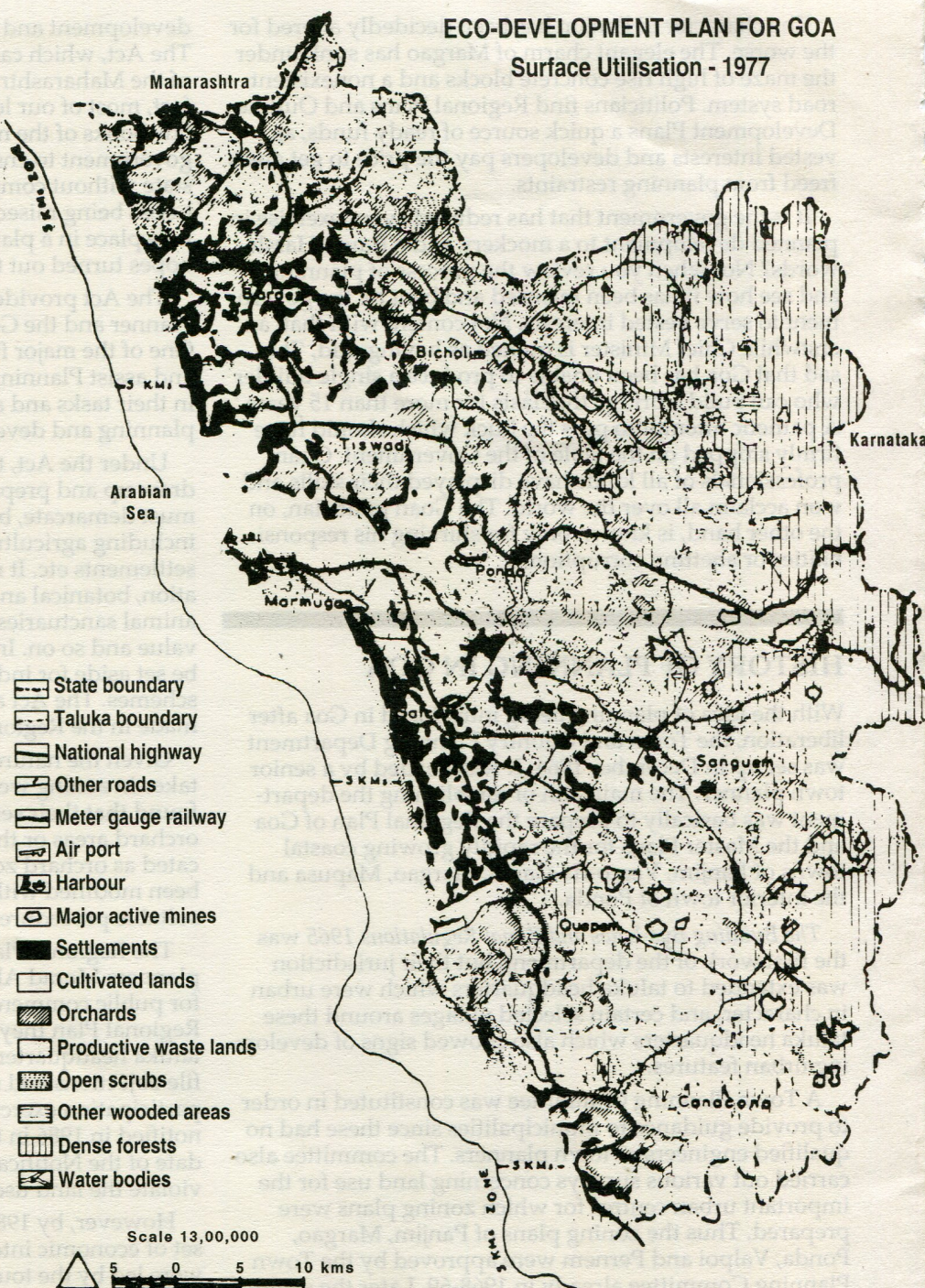
ECO-DEVELOPMENT PLAN FOR GOA

Surface Utilisation - 1977

since 1986 is actually in violation of the land uses originally statutorily notified. The government has subsequently submitted the revision of the Regional Plan—valid till the year 2001—to a private consultant. However, there is no guarantee that even the new Regional Plan, when notified, will not be subject to the pulls and pressures of moneyed parties who first buy land wherever they want and where it suits their purposes, confident that they can always have the Plan changed to regularize the new uses to which they intend to put the land. The politicians who control the Town and Country Planning Board relish the situation because they can earn enormous sums on every conversion or change in land use.

Politicians in fact have got an extremely canny understanding of such planning exercises and what they can be exploited for. If there are no restrictions on where and how people can construct their houses, there is no possibility of income for the politicians. The moment a statutory plan like the Regional Plan is imposed over the entire state, power to allow particular land uses changes passes over to the bureaucrat and to the politician. Invariably, the persons in charge of approving the land use changes—the Chief Minister, members of the Town and Country Planning Board and officials of the Town Planning department—acquire enormous discretionary powers and stand to benefit enormously. This is what has happened with the planning exercises under the Town & Country Planning Act. The Town and Country Planning Board is largely conducted as a circus, with individual members trying to get private changes accommodated and the men at the top clearing files that are not even placed before the other members. Agenda are manipulated or added as required. Politicians love such exercises in 'planned development' because it brings every one to their knees, as supplicants. No land use is rejected provided the money is right. No reasons are given for any of the land use changes. All are arbitrarily carried out. The Board proposes the changes; the Board approves them. Objections filed by citizens against proposed changes are routinely dumped into the waste-paper basket.

The sorriest episode in the history of planned development in Goa has involved the setting up of the Planning & Development Authorities. Under the Act, the Government must first notify planning areas, after which, Planning and Development Authorities (PDAs) have to prepare sound development schemes for the notified



planning areas i.e. the Outline Development Plans based on which the Comprehensive Development Plans are eventually prepared and notified.

The PDAs then set out to prepare the ODPs for the areas within their jurisdictions. However there is really nothing sacrosanct about even these ODPs and areas within them continue to be modified and revised to suit largely the interests of developers. Although the Act stipulates that all changes in the ODP must be in public interest and notified to the public, no information is ever given regarding the nature of the public interest involved.

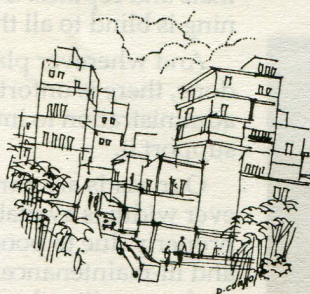
By 1986, the government had demarcated planning areas for Mormugao, Sanguem, Valpoi, Margao, Pernem, Bicholim, Sanquelim, Usgao, Quepem, Canacona, Ponda, Mapusa, Cavelossim, Colva-Benaulim, Sanvordem-

Curchorem, Candolim-Calangute-Anjuna and Panjim. Shortly thereafter, a few PDAs were notified. These were basically restricted to the coastal belt and Ponda. The government seems to have completely forgotten about setting up planning authorities for most of the other areas, which seems, in the final analysis, to have been a blessing in disguise.

The PDAs very rapidly became another source of harassment to the local population and the manner in which business was conducted at the Planning Board described above was repeated faithfully here. Corruption became rampant and very little planning was done. Eventually, the PDAs degenerated into bodies approving individual projects and constructions, where money could be extorted, abdicating their planning function altogether.

Little wonder that the Chairpersonship of the PDAs became a coveted post. At one time, the Government very nearly collapsed due to a dispute over the appointment of the chairperson to the Panjim PDA. Politicians or their cronies have invariably been made Chairmen of the planning authorities. Practically none of them has had any experience or interest in planning schemes or their implementation. Every time the Government is changed, the PDAs have been dismantled to get rid of the existing Chairperson and members and to accommodate a new Chairperson and members.

The PDAs have today become dens of corruption and have lost any reason for continuing in existence. Routine applications from ordinary citizens sometimes take two to three years to receive PDA approval whereas builders and developers are known to get even pre-dated permissions or building plans substituted for originals in files. The PDAs have therefore become a curse, not only to planning, but to the ordinary citizen in his quest for decent housing.



TOWN PLANNING: THE REALITY

Perhaps no other state in India had better opportunity than Goa to have a beautiful, well organised townscape. The towns were small. Density was very low. Land prices were not high. Thrust of development was not very high. There were no slums. There was no large scale poverty and acute shortage of resources. There was reasonably good civic sense among the people. This was the situation in the early years after Liberation. The Town and Country Planning Department (TCPD) was constituted around 1965. In spite of all this our towns are becoming more and more chaotic year by year.

For this tiny state of less than 4,000 sq km with total population of less than a million (now grown to one and a half), the TCPD lacked the vision and dynamism to channelise fast growth. Whatever efficiency and sincerity that existed was nullified by the everyday political interference. The naked show of the selfish interests that prevailed over the constitution, de-constitution and reconstitution of the Planning and Development Authorities (PDA) was a shameful affair. The planned road pattern of Panjim and Vasco laid down during the pre-liberation period still shows its existence and usefulness. Although the urban area has been increased multifold, neither the TCPD or PDAs can show any area as their accomplishment.

The Regional Plan for Goa has been changed so many times that it has lost its sanctity. Outline Development Plans (ODP) are still a dream for most of the towns of Goa.

PDAs neither do any planning nor any development. Scrutiny of plans for approval is the only job that they have been doing all along. The state of the TCPD is not any different from this. Planning is a multi-disciplinary activity and TCPD should orchestrate the programmes and perspectives of various authorities and disciplines. TCPD and PDAs are armed with sufficient powers to bring about the desired discipline in urban development. But these institutions being headed by politically nominated persons having neither intellectual background to understand planning process nor a strong political will.

Sadly, this was tolerated and indirectly accepted by the intelligentsia and the professional wisdom of this territory who failed to perform the duties of watchdogs. There is the Institute of Engineers, there is the Institute of Architects and also there is an Institute of Town Planners (the last one is mainly composed of Planners from TCPD). But none of them could act as a pressure group and cause required change in the process of planning and implementation. The discussions in these forums remained confined to approvals, processes, byelaws, coverage, FAR set backs, aesthetic controls and some such day-to-day issues of bread and butter. It is rare to find serious discussions on critical issues of planning; what form our townscape should take, what will be the problems in future, how to avoid them. Signalling the dangers, putting forth some alternate concepts, plans and processes and pressurising the issues at the level of authorities has just not been done.

In fact, the government also does not want any objections or suggestions. It only goes through the process to

somehow complete the formalities envisaged in the Town Planning Act. Those who approach the concerned department for copies of the plan get a cold reception. Perhaps keeping the people away is one of the causes of the failures of the planning process.

Our planners are yet to study the population dynamics, rate of growth in various sectors of human activity, such as habitation, commerce, industries, transport, make the future projections for the next 20 years and provide for the same. Issues like spaces for transport/communication, sanitation and services, recreation etc. with appropriateness of size and location need to be discussed. Topographical configurations such as inaccessibility due to steep hill slopes, deep valleys, low lying lands, marshes, etc. have not been properly understood and such areas have incorrectly been allowed for development. Geomorphology has been totally forgotten.

Natural heritage such as thick groves, perennial waterbodies, landscape of pristine beauty have been ignored. Significance of archaeology, art and cultural heritage has not been considered. Sites and edifices having heritage value have been allowed to go to ruin. Measures for protection of conservation zones have not been worked out, in spite of ceaseless efforts by some people like the author. Perennial waterbodies, thick groves, lush green paddy fields have been allowed to be destroyed. Climatic aspects like heat, humidity and rainfall have not been considered. Natural and man-made rain water drainage systems have been destroyed or deformed causing heavy siltation and floods. In areas like Porvorim where there is no public sewage system, heavy development has been allowed generating big loads of sewage which the small area of hard rocky strata cannot absorb. This has led to profuse breeding of mosquitoes. Malaria which was prevalent in Goa some seventy-five years back in the remote jungle villages has now settled in our towns.

Human settlements come up where there are perennial water sources. But these need to be conserved and

protected. Unfortunately, the reverse is true. Hundreds of wells and dozens of springs of perennial nature have been either destroyed or damaged significantly. Converting assets into hazards is the fallout of our ill-planning and ill-administration. These water sources could contribute substantially towards relieving the water shortages in the town besides adding to the health and beauty of the townscape. There are two springs in Panjim and there were more than 100 wells in the town. Same is the case with Margao.

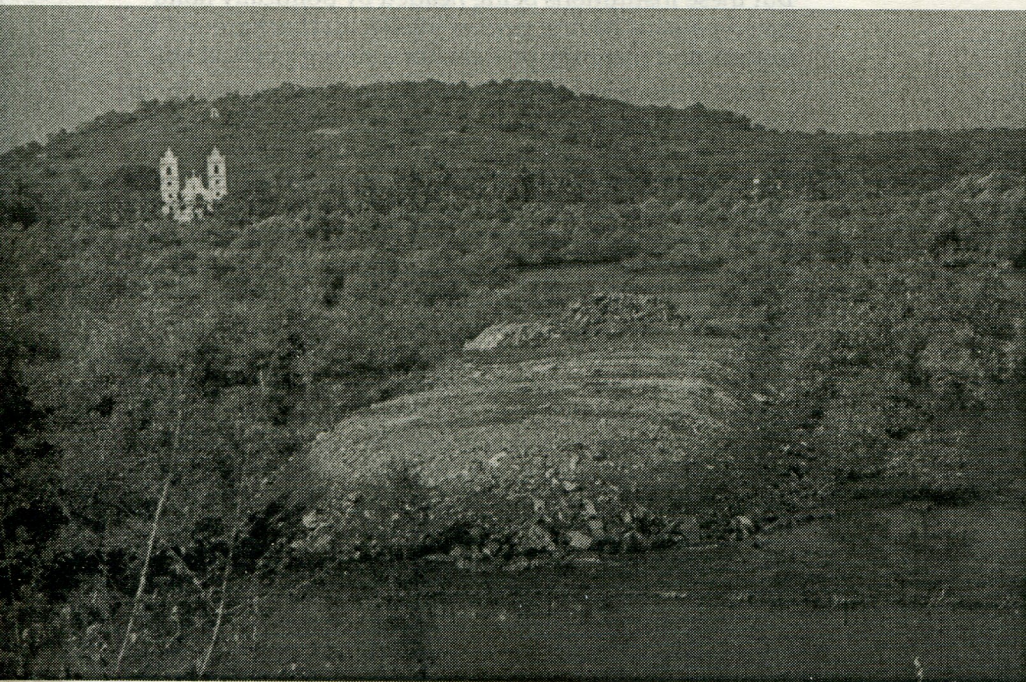
In Ponda there are nearly eight perennial springs, which, if developed properly, along with the 100 odd wells can provide water for more than half the population. The perennial 'nallah' passing through the town besides developing beautiful lush green landscape in and on the outskirts of the town and sustaining nearly one thousand population in their paddy cultivation, acts as single storm water drain for the entire urban and up-drain area of 10 sq km. The nallah is now the unofficial sewage drain as industries and towns folk simply dump their garbage in it. The lakes at Margao and Vasco have silted and are destroyed. Sanguem, Quepem and Sanquelim are blessed with sweet water rivers, running through the towns, having a capacity to meet the total water needs of the town. These rivers have not been considered in the planning for the town. In Sanvordem and Curchorem, the salt water river has ecological and recreational values. This has not been given any consideration. Like Panjim, Vasco has sea and river frontage. This is a very distinctive characteristic of the town. It has been given no significant place in retaining the character of the town. Water navigation is a subject not even touched upon in the planning process.

Most of our towns are blessed with a variety of interesting topographical features and beautiful natural vegetation: carpets of lush green paddy fields, bunds with rows of whispering coconut palms, patches of thick coconut thick groves and orchards, deep green areca groves, natural jungles on slopes, valleys, mangroves and also marshes with rare birds, mammals and reptiles. Our urban planning is blind to all these.

And wherever planning has been done, there is unfortunately no administration to implement or support it.

Our roads are narrow. But whatever width is available is not utilised properly due to poor construction and ill-maintenance. The road surface quality, the road shoulders, the roadside gutters, the location and alignment of other services such as water supply, sewage, underground telephone lines and manholes on the surface matter a lot as far as effective motorable width and pedestrian movements are concerned. So also features like electric and telephone poles, hoardings, hawkers' stalls, bus-stop lay-byes, footpaths, road dividers, road curves and junctions and similar other aspects of daily use need proper attention, if they are not

Illegal landfilling at Nerul, Bardez, in mangrove area preparatory to construction



to become hindrances to road-users. These are aspects for consideration at the start of the Comprehensive Development Plan.

With the phenomenal growth of goods transport by road, the transport vehicles traversing the busy commercial and residential areas block the roads. This aspect is kept out of planning considerations. There should have been separate heavy vehicle zones where transport vehicles can be parked. Today, thousands of lorries cross the busy roads and a hundred halt overnight. No provision is made for them. Bypasses need to be developed. Wherever they have been constructed, the situation has improved. Also, wherever bus stands have been shifted from town centres to outskirts, there is an improvement.

Market supply of day-to-day provisions like vegetables, fish, grocery items etc.:

As most of the eatables are supplied from here, perfect sanitary conditions should prevail there. Due to non-planning or ill planning and ill administration, just the contrary situation prevails there. The market place is a big mess packed as it is in a small area. A couple of years ago, some accident caused a fire and half the market turned into ashes. It was really a tough job for the fire-fighters. Hawkers are a common feature of Indian towns. They occupy roads and footpaths with total indifference of the authorities. The High Court had to come down heavily on the authorities compelling them to clear the footpaths.

Waste management is in a pitiable condition. None of the Municipalities has any systematic waste management system. Margao's biodegradation plant set up with foreign collaboration has failed. Most of the municipalities have not got land to dump the garbage. The villagers constantly play 'passing the parcel' with the municipalities in regard to dumping of garbage in their area. The waste collection, transportation and the disposal process is crude, unscientific and unsanitary.

There were no slums in Goa when the process of town planning started. But now the slums in conventional form have come in practically every town.

It was not so long ago that people in Goa had no grills on their windows and they could leave them open at night. But today, security is as much a concern for an urbanite living in the heart of the city as for a person staying in a lone house in a remote place. Theft is a daily affair. The number of road accidents has given this state the designation of a 'murder state'. The safe return home of a grown-up girl from college or work is a matter of anxiety for her household.

The situation in other states might be worse than here. But that does not justify the present situation. We have had better conditions prevailing here which could have made Goa a model state. We have failed. It is not only the failure on the part of the Department of Town and Country Planning; it is also failure on the part of our



Solid waste found discharged in St. Inez nallah in Panjim

administrators, intelligentsia and general public of the state who with shortsightedness and short-term personal interest have allowed the greater good of all to suffer.

Environmental activism, comparatively young in the state, has done some work, especially in restraining some of the unecological developments by means of strong people's movements and legal battles. But in general there is public apathy towards planning issues. When the Tourism Master Plan was declared by the Government, and objections and suggestions were invited, the public's response was cold.

Active environmental organisations reacted. Some lone architects and a couple of intellectuals came forward. Otherwise there were only hundreds of requests from individuals to include their properties in the zone earmarked for development. This is one side of the story. On the other hand, the government has never really welcomed the participation of the people or the experts.

The lack of active interest exhibited by the citizens in civic matters and traffic rules, cleanliness and sanitation, environment, administration, consumer rights and development of the town makes them pay a heavy price. Unfortunately, this price is not paid by us alone but it will also have to be paid by the innocent children yet to be born.

We Indians boast of thousands of years of heritage of Town Planning with Mohenjo Daro and Harappa civilization. What is the quality of our town designs today? What are the types of towns we have inherited from our ancestors and in what state are we passing them over to posterity? Heritage of good living or heritage of problems?

K.D. Sadhale

PLANS, PLANS AND PLANS

There are several extremely interesting documents on following ecodevelopment strategies for Goa's development. One was the Ecodevelopment Plan for Goa. Another is the Regional Plan for Goa. The former cannibalised a good deal of data from the Regional Plan, since it refers to the Regional Plan, in its introduction, as a Draft Regional Plan. We also have a Coastal Zone Management Plan. Since these documents are extremely important, they are being reviewed separately.

Ecodevelopment Plan for Goa — pp 136 (1982) Planning Commission, New Delhi

The Ecodevelopment Plan for Goa was a part of a more general exercise being carried out concerning development in the hill areas, in this case, the Konkan region of Maharashtra and more specifically, the Western Ghats. On May 22, 1981, the Task Force notified five subgroups to prepare the Ecodevelopment Plan. The Plan in its final form is largely the reports of the five subgroups. The first dealt with land use planning, including the tenure system, ownership and management of land; the second with water conservation including watershed management; the third with mining and communication; the fourth with coastal area planning including marine fishing and the fifth with afforestation including national parks and environment. (Another subgroup was later set up to oversee implementation of the recommendations of the Task Force.)

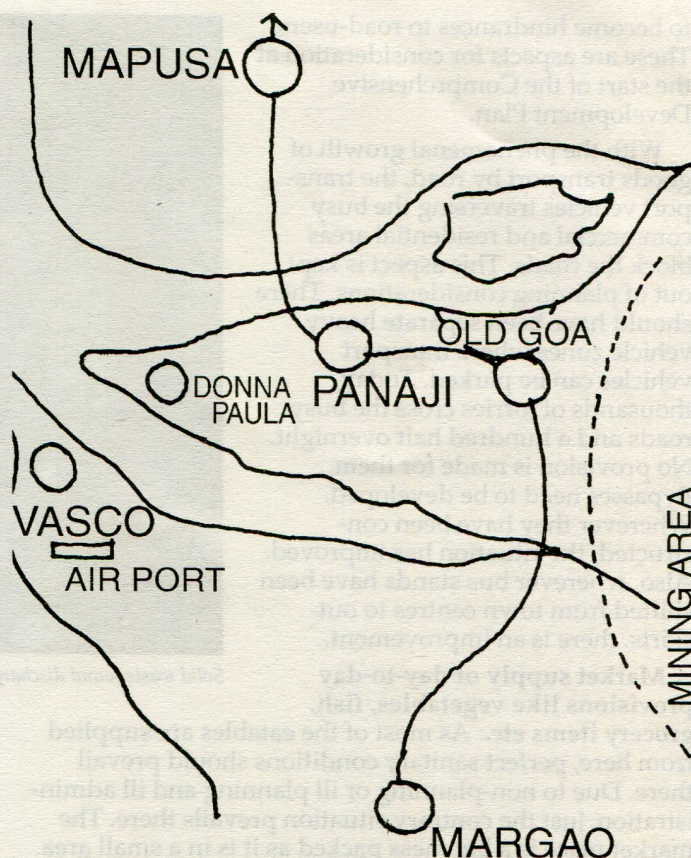
The first subgroup report on land resources and land use planning includes an introduction to the general physical features of Goa, the land use pattern then, the sectorial land use pattern, the comunidade system, criteria for land use and agricultural planning.

The section on water conservation and utilisation dealt with climate and hydro-geology, irrigation, surface and groundwater resources, including development plans, command area development, salinity problems and watershed protection measures. This section was heavily oriented towards the centralised water management system associated with large dams. There appeared to be a total lack of attention paid to water harvesting and conservation measures.

The section on forests examined the present status of forests and their management in Goa, conservation of natural living resources in sanctuaries, natural parks and biosphere reserves. It also dealt with the effects of mining and irrigation projects on forests, and measures relating to forest conservation and afforestation. It recommended complete stoppage of *kumeri* cultivation.

The section on conservation of natural and cultural heritage and environment identified the following major problems:

- i. Haphazard and unintended development along the roads, river fronts and beaches.
- ii. Considerable congestion in cities.
- iii. Large-scale cutting of trees and hill slopes, resulting not only in the degradation of natural environment but also giving rise to certain ecological problems.
- iv. Construction of aesthetically unpleasant, unimaginative buildings in towns, which are also aesthetically incompatible with the surrounding areas.



v. Undesirable development around historical monuments, viz. churches, temples etc., ruining the cultural heritage.

The Eco-Development Plan argued for conservation and control of development of areas on the waterfront, hill slopes and beaches.

It noted that the man-made environment (architecture) did not show any continuity with earlier architecture. It also talked of planning for tourism development, with ecological conservation.

The sub-report on mining documented the damage caused by mining to the Goan environment, particularly to agricultural land and forests, the pollution of water streams and rivers, depletion of groundwater and damage to beaches by silica sand mining. It made a number of suggestions for controlling the problem and ended up by recommending the setting up of an Ecological Mining Board and setting aside funds for restoring the damage to ecology. 20 years later, these recommendations are yet to be carried out!

The chapter on Coastal Area Planning dealt with marine capture fisheries and coastal aquaculture including *khazans*. It recorded sources of aquatic pollution and then enumerated measures for flood control and for protection of the coastline from erosion. It also discussed mangroves and the sand dune system, and ended up with suggestions for conservation and utilisation of sand dunes.

A final chapter on administrative and institutional arrangements for implementing the recommendations of the Task Force enumerated the setting up of an Urban

Administrative Commission, an Ecological Mining Board and an Ecological Development Council. It recommended that the Town and Country Planning Board also perform the functions of a Land Use Board. It ended by recommending the setting up of an Institute of Environmental Education and Management.

There are several annexures to the report including a 12-page list of Action Items and a list of the relevant government departments responsible for executing these items. The plan also provided details of minor and medium irrigation tanks, forest area tables, list of wildlife encountered in Goan sanctuaries and statements showing details of mining concessions and the area affected, due to wash-off from dumps and mining.

The report was by and large a result of the interaction between a number of bureaucrats from the Goa Government, the Central Government and members of a few scientific institutions. The public and NGO groups were completely ignored in the discussion, with the natural result that the Ecodevelopment Plan is still largely unheard of among the public, despite the fact that the entire exercise was carried out in public interest.

Regional Plan for Goa 2001 A.D. — Town and Country Planning Department, Government of Goa, pp 108 (1988) Government Printing Press, Panjim

The Regional Plan for Goa is a statutory plan prepared under the provisions of the Town and Country Planning Act, 1974. It was approved by the Town and Country Planning Board in December 1981 and notified for inviting public objections and suggestions in February 1982. According to the preface to the plan document, the plan was given extensive publicity. Officials of the Town and Country Planning Department attended special Gram Sabha meetings in all the panchayats throughout Goa. After all the objections and suggestions were considered, it was approved by the Government of Goa in October 1986 and gazetted in December 1986.

The Plan was to form the basis for:

- i. furthering micro-level town and country planning as well as zoning activities, including the preparation of Outline Development Plans and Comprehensive Development Plans.

- ii. considering major development proposals and taking decisions affecting land use on a large scale.

The assessment of resource potentials and the present level of physical, economic and social development and spatial distribution of settlements brought out various gaps and structural bottlenecks in the way of balanced regional growth. There were also problems associated with competing, and sometimes conflicting, land uses and activities. Based on the twin principles of conservation and development, the Regional Plan was explicitly formulated to resolve such conflicts and bottlenecks.

Due to geopolitical forces in the past and mainly due to the tremendous boom in economic activities in the post-liberation period, the level of development in the coastal talukas has always been disproportionately higher than that of the midland and Western Ghat talukas.

The development strategy in the Plan was based on four premises:

1. The basic premise adopted was that although the coastal talukas would continue to maintain their domi-

nant position, the focus of new development would now be shifted mainly to the midland and Western Ghat talukas. In the coastal talukas, more emphasis was to be laid on control and consolidation of development, while in the midland and Western Ghat talukas, more attention would be paid to land conservation.

2. A balanced distribution of population was proposed to be achieved through judicious land allocation strategy and location of industries.

3. The plan proposed to strengthen and broad-base the network of infrastructural facilities to facilitate the above.

4. The present role played by various sectors towards overall regional economy was bound to undergo certain structural changes. For example, while the role of the mining sector, with its finite resources and vulnerable international market, might probably show signs of decline, the tertiary sector, namely tourism, with its present buoyancy might become the single largest source of employment.

The main chapter of the plan document examined population projections and human settlement strategies. After analysing surface utilisation, it set out proposals for development of agriculture, animal husbandry, forestry, fisheries, mining, industry and tourism. It also laid out proposals for infrastructure development, including irrigation, water supply and sewerage, transport and communication, power, housing, education, health, sports and recreational facilities. It ended with proposals for an organisational setup to implement the Plan.

The Regional Plan was formulated keeping in mind a railway alignment through the hinterland of Goa. For the same reason, many industrial estates and several plan proposals were proposed to be located in the interior of Goa. The new Konkan Railway alignment, however, effectively demolished the very basis of most of the Regional Plan proposals and thus effectively destroyed the utility of the plan.

One of the most unusual aspects of the proposals regarding surface utilisation being made in the Plan is 100 per cent elimination of wastelands. Scientific opinion has veered around to the view that very few wastelands are actually 'wastelands'. Many such lands are actually wetlands, which are important areas for biodiversity and resources for bird and animal life. Many of our bare plateaus for instance may not have anything on them, but they function as water harvesting areas, charging natural springs, gullies and slopes below them and it is in these latter areas, that a large number of Goa's horticultural gardens are maintained. The planners in charge would do well to reexamine whether it is environmentally desirable to reduce these so called wastelands, which today occupy about 18 per cent of the land area, to nothing on the alleged grounds that they are doing nothing.

Needless to say, this largely excellent exercise in sustainable development has been ruined by ruling Goan politicians with the active cooperation, assistance and support of several officials from the Town and Country Planning Department.

Immediately after the Plan was notified in December 1986, the government brought forth an amendment, enabling it to alter and modify the proposals at will. When the first changes were notified, a large number of objections were filed by public-spirited individuals and

activist organisations. All were rejected and the changes allowed. Today, the Regional Plan looks very much like a senseless multicoloured canvas, completely bereft of whatever planning it sought to implement.

Regional Plan for Goa 2011 A.D. — Town and Country Planning Department, Government of Goa.

As the first Regional Plan ostensibly dealt with land use in relation to planned development upto 2001, a new Regional Plan was ordered by the Goa Government in 1999.

In complete violation of the 73rd and 74th Constitutional amendments, the task of preparing the new Regional Plan was actually tendered to the lowest possible bidder (Consulting Engineering Services), the same organisation that was also entrusted with the preparation of the Master Tourism Plan. How a private consultant's firm based in Delhi could conduct a planning exercise for Goa more than 1500 kms away beats the imagination. But this is symbolic of how the Goa administration functions.

The consultants have produced a draft Regional Plan (in two bulky volumes) which has been put up for discussion. The first is the Basic Information Report (BIR); the second, is the Draft Sectorial Report (SR). If these two reports are any indication of how the consultants are approaching the preparation of the revised Regional Plan, then we need not expect any major surprises. But what can you expect when the planners and the people they are planning for are more than 1500 kms apart?

The BIR and the SR contain a lot of data, but much of this is already available either in published form or with the statistics department. Some of the information is lifted straightaway and without so much as a thank you for the work of other organisations. The entire discussion on conservation in Goa, for example, is taken mostly from the report of the Conservation Committee. The discussion on mining is lifted mostly from the TERI study on mining and its environmental impacts.

Just how careless, cursory and thoughtless the Reports are can be gauged from the following facts:

1. An entire table devoted to the composition of solid waste in Goa does not mention plastic, which according to the Municipal Councils is 60% of the volume.
2. The newly installed sewerage network of Margao finds no mention in the chapter on sewage and sewerage.
3. Despite the fact that even banks have stopped financing plastic manufacturing firms, the consultants feel that the plastic processing industry has good potential!

The principal conclusion of the Reports is that developmental efforts need to be concentrated now in the mid-land talukas of Ponda, Bicholim, Quepem and Pernem. However, this is nothing new. The first Regional Plan of Goa was based on arresting further development in the overdeveloped coastal belts. What happened? The overloading continued.

The significant contradiction is to be found in the final chapters of both the Reports. The BIR insists that planned development is the prerogative of the Panchayats and the Municipal Councils. The SR talks of the old scheme of PDAs, Town and Country Planning Board and the Eco-Development Council (EDC). The EDC died a long time back (1990), but the news has yet to reach Delhi.

PLANNING FOR GOA'S COASTAL AREAS

A number of exercises have been carried out by the Goa Government through different agencies to examine the ecology of the Goan coastal system and to prepare plans and strategies for protection of our invaluable coastal assets.

The awareness of such ecological endowments among government officials was first stimulated by public protest in South Goa (particularly in Arossim and Cavelossim) against the extraction of sand from sand dunes.

In 1982, the government asked the Eco-development Task Force to prepare a comprehensive plan for Goa's development based on conservation of natural resources. This document has a section on Coastal Area Planning. Thereafter, there is a discussion about the need for proper planning of coastal areas in the statutory Regional Plan for Goa which was notified under the provisions of the Town and Country Planning Act in 1986.

One of the major highlights of the Regional Plan's proposals was its rather frank admission that 80% of the economic activities of the state (with the exception of mining) were almost wholly located in the coastal belt. The Regional Plan therefore adopted a strategy that was intended to shift and stimulate development in the middle region of Goa. With this end in view, even the then proposed railway route was shown as avoiding the overdeveloped coast and taking the middle areas including Ponda.

Despite these elaborate plan exercises, the past trends of concentrating more and more development in the coastal region has continued since the government seems wholly incapable of resisting the lucrative inducements such development offers.

Once the Regional Plan was notified, the government once again asked the Town and Country Planning department to get together experts and to prepare a status report and an Environmental Management Plan (EMP) for the coastal areas of Goa. Pressure for this came from the Ministry of Environment and Forests in New Delhi. The notification for setting up a committee for the purpose was issued on 23rd December 1988. The terms of reference of the Committee's work are given below:

i. Identification of the present status of physical developments, vacant land, land use, etc. in the 500 metre area of the high tide line in a map or series of maps; evaluation of proposals for development; to clearly demarcate areas of conservation, preservation and development of this coastal stretch in the management plan.

ii. Evaluation of the status of marine/coastal pollution to take appropriate steps for its prevention and abatement.

iii. Evaluation of legal and socioeconomic status of fishing villages along the beaches and their implications for the conservation and preservation of beaches.

iv. Assessment of sea erosion, protection measures undertaken so far, their implication in terms of accretion/new erosion areas or creation of new mudbanks, etc. Analysis of sea protection measures, with reference to

urbanisation, marine exploitation activities, agricultural development and port developments.

v. Assessment of the coastal ecosystem with particular reference to endemic species of flora in contrast to monoculture of coconut palm along the sea coast.

Several experts from the NIO, the Irrigation Department, Central Pollution Control Board, State Pollution Control Board and the Directorate of Fisheries were involved in the exercise and a 102 page report titled was eventually formalised.

The report (a copy of which can be accessed through the Goa Foundation), is fairly detailed in terms of its study of land utilisation and settlement patterns in the state. It examines the existing land use and patterns of density. It also examines infrastructural capacity including water supply, sewerage and transportation. There are two detailed chapters on environmental pollution and development of fisheries. There is a chapter on coastal erosion and a final chapter on the flora and fauna of the Goan coastal area and problems associated with development of groundwater in the area. The report concludes with proposals and recommendations.

Thereafter, in February 1991, the Ministry of Environment and Forests issued the Coastal Regulation Zone notification which is now the law controlling development in the coastal zones including rivers which face tidal action. The new notification required the Goa Government to prepare a Coastal Zone Management Plan (CZMP) in the light of requirements given in the notification. The CZMP was to be prepared within one year. One would have thought that since the Goa Government already had an environmental management plan (EMP), it would be the first among the coastal states to prepare the Coastal Zone Management Plan within the required time and also get it approved. However this was not to be because of the intervention of a wholly corrupt clique of politicians, town planners and builders.

For a full five years (1991-1996), the Town Planning Department, supported by the government, tried out every scheme in the book to frustrate the CRZ notification and to illegally encourage development in the coastal areas. Since the CZMP, if prepared as per the norms of the CRZ notification, would not permit such activities, the government first prepared a completely false and misleading CZMP.

The government classified 69 of the 71 kms of Goa's beaches as CRZ-II areas. CRZ-II only applies to cities as highly developed as Mumbai and Chennai. And according to the Goa Government, even areas like Morgim in Pernem and Galgibaga in Cancona were 'highly developed with all infrastructural facilities'.

The Goa Government also refused to include its tidal rivers and estuarine areas in the CZMP, saying they should only be governed by local town planning laws.

Fortunately for Goa, after the CZMP was submitted to the Central Government, a Task Force set up by the Environment Ministry to examine such plans visited Goa to examine the reality on the ground. It discovered that the classification submitted by the Goa Government was largely false. Mr. Shyam Chainani, a member of the Task Force (and a great and well-known environmentalist who has taken great interest in the protection of Goa's beaches) came equipped with rolls of film and took

hundreds of photographs of Goa's beach areas and coastal villages. Once this evidence was presented at the next Task Force meeting, the Goa Government had to beat a hasty retreat.

Thereafter, the Task Force took a decision to reclassify most of the CRZ-II areas as CRZ-III and sent the Goa Government and its officials back to the drawing board. Even the subsequent draft CZMP prepared by the Goa Government in 1996 had to be revised and modified by the MoEF, but this time it was done pursuant to orders of the Supreme Court which was appalled to discover that more than five years after the CRZ Notification had come into force, none of the coastal states had got their CZMPs approved by the Ministry. The approved CZMP for Goa is dated 27th September, 1996.

The CZMP would have remained a classified secret if it were not that the Goa Foundation procured a copy and had it published within a month of the order approving it. (*See chapter 12 for a complete copy of the approved CZMP*).

The Goa Government, however, refused to implement the CZMP after it was approved, till the Goa Foundation dragged it again to the High Court. It was only in 1998 that the government finally assured the Court that it was implementing the CZMP as approved.

Subsequently, in November 1998, also pursuant to the direction of the apex court, the Environment Ministry set up the Goa Coastal Zone Management Authority (GCZMA) to look into violations of the CRZ notification in Goa and to conserve the beaches and demarcate ecologically sensitive areas. The GCZMA was reconstituted in June 1999 and again reconstituted in January 2002.

At the time of writing, the GCZMA has already conducted several meetings and taken several critical decisions. For example, it decided to hand over demarcation of the high tide line (HTL), and of sand dune and mangrove areas to the NIO. Work on the demarcation of the HTL, a contentious issue in Goa, is now almost complete. The GCZMA also took a firm decision to discourage large scale five-star resorts in the state in future and to go in for tented accommodation wherever possible so that the integrity of Goa's beaches are not further compromised.

The GCZMA also put a firm ban on approvals for any multistoreyed constructions in the coastal belt.

Recently, as a result of a petition filed by the Goa Foundation, the High Court took on record a scheme submitted by the Goa Government for continuous surveillance of CRZ areas in order to prevent illegal constructions. A huge list of CRZ violations has now been submitted by the government to the GCZMA and it is in the process of visiting the illegal buildings and issuing notice to the offending parties. Eventually, electricity and water supplies to the constructions will be cut off and panchayats will be directed to demolish the illegal buildings.

The GCZMA is severely hampered due to the peculiar circumstances in which it has to operate. Though appointed by the MoEF in Delhi, funds and staff for its operations come from the State Government. At the present, it has one full-time staff loaned to it from another government department!

PANJIM: PRINCESS OF THE MANDOVI

Panjim, situated in Tiswadi taluka, is the capital city of Goa and its administrative seat. It lies on the left bank of the river Mandovi. It comprises several wards like Fontainhas (Mala); St. Tome; Boca de Vaca; Portais; Bhatlem; Tonca; Alto Guimaraes; Campal; St. Inez; Gaspar Dias (Miramar); Ribandar; Dona Paula; etc. The city extends over an area of nearly 8.37 sq kms.

History and Evolution — Panjim shares a wealth of beauty and memories. Her history goes back to the *Purta Dharma*s—the charitable deeds of Gandagopal Kelima, whose grandfather, Kalapa, was entrusted with the administration of Panjim by the Kadamba king Shasthadeva (1007-1050), a good and a glorious king who 'by his works redressed all the wrongs in his kingdom'. This is gathered from an inscription of the Kadamba king Vijayaditya I, dated February 7, 1107, and it refers to Panjim as Pahajani Khali—'Pahajani' from which Panjim supposedly got its name, and 'khali' probably refers to the creeks and backwaters abounding in this area. The first few Portuguese chroniclers, soon after the conquest of Goa, refer to Panjim as *Panji* or *Ponji* which is said to mean 'land that never gets flooded', but the distinguished Portuguese philologist Gonsalves Cardoso, says that the word *Pongy* is derived from *Panch Yma Afsumgary* or 'five wonderful castles' where the Muslim king Ismail—Adil Shah and his wives used to live. Its name was later changed by the Portuguese into 'Panjim' (Goa—'Notas Historicas' by Antonio de Menezes). The Goa Government changed its name to 'Panjim' after Liberation.

Panjim was a neglected ward of Taleigao village. It was, in fact, a large coconut grove interspersed with ponds, backwaters, creeks, canals, sand dunes and paddy fields. The only conspicuous construction existing there was the 15th century fort built by Adil Shah on the banks of the Mandovi river.

It was the Viceroy, Count of Linhares, Dom Minguel de Noronha, who linked Panjim with Ribandar village by a 3.2 kms long causeway, known as 'Ponte de Linhares' (Linhares Bridge). The expertise of the Jesuits of the College of St. Paul in Old Goa was availed of in 1632 and

the massive bridge, the longest and the oldest in the whole east, was built on alluvial soil after stabilising it with solid trunks of local timber known as 'zambo' or 'jambo' (*Xiliadola briformis*). The superstructure of the bridge was constructed exclusively in laterite stone. It is indeed surprising that this bridge originally designed for light traffic of horse driven carriages, today copes with heavy vehicular traffic loads. All these developments took place against the background of the growth of the city of Old Goa and its neighbourhood. The drive behind this technical process was clearly part of a complex social and economic background.

During the first forty years of Christianisation, the Portuguese set up three main churches in the area comprising of the old Taleigao village. In Panjim, a hermitage came up prior to 1541, and it is surmised that it was built by workers from Portugal. The Dominicans were in charge of it till the end of the 16th century. In 1600 it was made a parochial church and rebuilt in 1619. Its majestic double staircase, rising in angled planes from the main church square was built in 1870. It has the usual Baroque facade, with twin balustraded towers and an imposing central gable which carries the main bell. This church dominates the whole front square in the heart of the city.

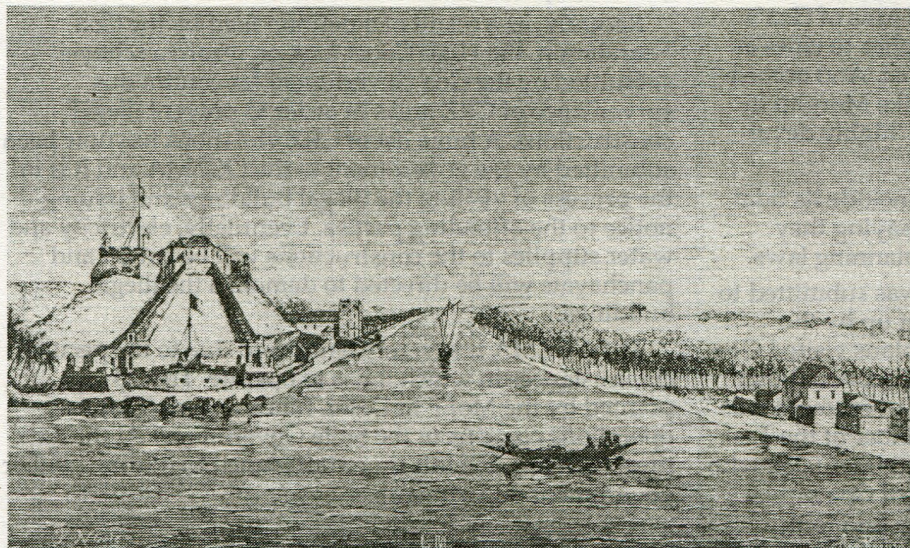
In Taleigao, the church was constructed a little later, in 1544. At St. Inez there was also a hermitage which was built in 1584 by Dom Francisco d'Eca, who after its construction donated it to the religious order of St. Augustine in 1601. However a few years later Dom Francisco d'Eca reconstructed the hermitage which was raised to the category of church by the Archbishop, Dom Frei Aleixo de Menezes in 1606. It was at this stage that the areas of Panjim and St. Inez got detached from Taleigao and formed separate parishes.

On December 1, 1759, the Viceroy Dom Manuel de Saldanha de Albuquerque, Count of Ega, shifted his residence from Panelim (near Old Goa) to Panjim. For this purpose, the old fort of Adil Shah was totally remodelled and a palace was built where, at present, the government secretariat stands. The moat which was encircling the Adil Shah's palace, on the southern side, was filled and made into a road. Also, the area for the large Mohammedan harem was levelled. Later, over this

site, in the years 1851-55, the building of 'Contadoria' or 'Fazenda' (now accounts department) came up. As we shall see later, another strip of road on the northern side of the secretariat was built by reclaiming the river bed. With this development, a motorable road was laid around the secretariat.

On the eastern side lies the present ward of Fontainhas which was an alluvial stretch with a long canal, shielded on the west by a low hill. This area was given on lease to Antonio Joao de Sequeria, nicknamed as 'Mossmikar', because he had returned from Mozambique (East Africa) where he had amassed wealth which enabled him to make new investments in Goa. Sequeria

Panjim river banks (1871)



soon turned the alluvial area into a coconut grove and named it 'Palmar Ponte' probably because the Ponte de Linhares (Linhares Bridge) was close by. By this time a few houses started coming up on the slope of the hill, which was later named as 'Hill of Conceicao' because of the proximity of the church of Our Lady of Conception. After the death of Antonio Joao de Sequeria, the treasury office (*Fazenda Publica*) in 1784 donated the 'Palmar Ponte' to the convent of Our Lady of Carmo at Chimbél. At that time the area was dotted with several huts inhabited by fishermen, sailors and persons engaged in the oil extraction trade. In the meantime, due to the deteriorated sanitary conditions of Old Goa, a few offices from the old capital were shifted to Panjim between the years 1810-1839. Due to these circumstances, a large number of petitions for lease of land in the new area started pouring into the convent of Our Lady of Carmo at Chimbél. The Carmelites were prompt to lease out the land without observing any rules of urbanisation. The area of Araddy (Portais) and Fontainhas in Panjim soon got urbanised in a haphazard way, with narrow paths winding through small dwellings and huts.

On the other side of the Conceicao hill, towards the northwest, a large tract of land, extending from the site where the building of the Panjim Municipal Council presently lies right upto the Pharmacy College, was also a dense palm grove known as '*Japao*'. This land belonged to the Condes de Nova Goa, a Portuguese noble family settled in Goa in the early 18th century. The heirs of the family, D. Ana Rita Josefa d'Almeida and her son D. Jose Maria de Castro, Count of Nova Goa, relinquished all their rights to this property on May 28, 1831 when the government acquired it for the development of the new township. Their palace was located on the present site of Don Bosco School.

The same was the case of the land in front of the Panjim church known as '*Matmor*' or '*Palmar de Minguel Jose*'. It was a lease given by Royal Order to Dom Minguel Jose da Conceicao. Part of this land was a dense coconut grove. The other non-cultivable land was acquired later by the Panjim Municipality which was utilised for the development of Panjim square, Municipal Garden etc.

On the border of the river, the Count of Maquinezes had his land with a palace and a chapel dedicated to Our Lady of Victory built in 1776-80. Later, this palace was purchased by the government for housing the Goa Medical School, near the market. Another nobleman who had a manorial house in Panjim around 1775 was D. Lourenco de Noronha. This house was demolished in 1950 for the construction of the Hotel Mandovi.

The Viceroy, Dom Manuel de Portugal e Castro (1826-35) is perhaps the one who devoted his best attention to the development of Panjim. He has been rightly called the 'Father of Panjim Town'. He carried out extensive works of reclamation and levelling of the area starting from



Wetlands being covered up for construction activities in Panjim

GMC Hospital Complex and covering the whole of Campal and Gaspar Dias till Tonca. Thus was formed a large expanse flat land which was called 'Campo de D. Manuel'. To avoid clogging of water in this land, two long canals served as drainage, and to make the traffic smooth, five large Roman arched culverts were laid over the canals. The massive constructions in the town like the customs building, the 'complex' housing the police department and other government departments were also due to his initiative.

The Fontainhas ward owes much to the efforts of the Governor Jose Joaquim Lopes de Lima (1840-1842) who opened a straight road through Fontainhas which was known as '*Quatro de Abril*'. Today, it is named 'Dr. Luis de Cunha Gonsalves Road'. This governor made a request to Queen Mary II of Portugal to bestow the status of the city upon the town. The Government of Portugal responded positively to his request and at the time of the Governor, Count of Antas (1842-43), by Royal Order dated March 22, 1843, Panjim under the name of 'Nova Goa' was raised to the category of a city, with all the privileges, prerogatives and liberty, similar to other cities of Portugal. The prestigious Medical School was also established by then in the new city. The present Azad Maidan and the monument of Afonso de Albuquerque was planned in 1842 and completed in 1844 during the term of the Governor Jose Ferreira Pestana (1844-51) who contributed in a great measure to the further expansion and beautification of the town.

The Governor, Viscount of Ourem, Joaquim Jose Januario Lapa (1851-55) did a commendable work by draining the Fontainhas creek and building marginal roads on both of its sides. The Ourem road on the Fontainhas side is named after him. During his time, the fountain 'Phoenix' at Fontainhas (Mala), which provided potable water to the city, was also built.

The Governor, Count of Torres Novas (1855-64), introduced sanitary measures in the new city, developed the church square (then named '*Praca de Flores*') and the present Municipal Garden. He also initiated the work of

several internal roads in Fontainhas, Portais and the construction of a five kilometres trunk road from Don Bosco School upto Dona Paula which was a major achievement for the development of Panjim.

An overall plan for the central and peripheral zones of the new city was devised by the Governor Januario Correia de Almeida (1870-71). This ambitious plan suffered a temporary setback due to his early transfer. It was, however, put into execution in later stages by his successors.

During the short tenure of Governor Antonio Sergio de Sousa (1877-78), a great impulse was given for the urbanisation of the large coconut groves 'Japao' and 'Maquinezes'. Panjim city was also linked with the village of St. Inez through a road which bears his name.

The energetic Governor, Caetano Alexandre Almeida de Albuquerque (1878-82), followed the plan of his predecessor, Januario Correia de Almeida. He opened another road through the two dense coconut groves, 'Japao' and 'Minguel Jose'. The 'Conceicao Hill'—a ridge which by geographical accident is running in south-north direction—was acting as a barrier between Fontainhas and the central zone of the city. It was during the tenure of this governor that the two zones were conveniently linked through a 302 m long section known as 'Corte de Oiteiro'. The huge quantity of soil derived from cutting of the section was suitably utilised for filling up sizeable swampy areas of the central zone of the city. For this major work, the name of Governor Caetano de Albuquerque will always be remembered. The whole alluvial area

Signs of renewal: Renovated staircase near Ajuda church, Ribandar



on the river front near the secretariat was also established and drained, creating thereby a new road known as 'Aterro Marginal', the present marginal road in front of secretariat.

During the tenure of Governor Carlos Eugenio Correia da Silva (1882-85) and his illustrious Chief-Secretary, Dr. Jose Maria Teixeira Cuimares, a development programme for construction of minor roads and maintenance of gardens was envisaged. Part of 'Conceicao Hill', behind the old lyceum buildings, which was by then a sizeable settlement, got connected to the Rua de Natal in Fontainhas by way of a masonry flight of steps.

A new look was given to the capital city when the Governor, General Eduardo Galhardo (1900-05), set footpaths to the main thoroughfares of the central zone of the city. Also, the work of opening new streets serving as linkages to the main roads continued unabated. The new city received, however, a great boost to its development by the construction of a four carriage avenue with ornamental trees, starting from Hotel Mandovi upto Military Hospital, near Kala Academy, which is now named as D.B. Bandodkar road. This avenue conceived and partly executed by the last monarchical Governor, engineer Jose Maria de Sousa Horta e Costa (1907-1910), is one of Panjim's landmarks.

In 1922, during the tenure of the Governor Jaime Alberto de Castro Morais (1919-1925), a committee was set up for the improvement of the city of Vasco-da-Gama and the town of Curchorem. The committee was known as 'Comissao de Melhoramentos de Mormugao'. It was headed by a progressive engineer, Luis A. de Maravilhas. This engineer, after having laid out and executed the work of urbanisation of Vasco and Curchorem, was invited by the Panjim Municipality to improve the urban pattern and settlement zones of the Panjim city, with the exception of Fontainhas, St. Tome, Portais and secretariat zone. The area beyond the church square and covering the whole western zone of the city till Tonca was planned by engineer Maravilhas. It was a logical planning, with characteristics of a colonial city. The grid pattern of roads, of more than average broadness and large footpaths with provision for tree plantation, was soon put into action.

Panjim received a further boost during the time of Governor Joao Carlos Craveiro Lopes (1929-36), when a programme for tarring of all the roads of the city was undertaken. He also undertook the development of the Altinho area. Electrification of the city was introduced in 1931.

In 1940, Dr. Froilano de Melo, president of Panjim Municipality, devised a plan for the beautification of Panjim, particularly the church square, the present '18th June Road' and the 'Campal' zone. The latter still bears the imprint of the programme carried out at that time.

During the exposition of St. Francis Xavier in 1952, Panjim witnessed an overall face-lift. The stretch between State Bank of India and the Secretariat was freed from all commercial stalls and a wide marginal road was opened. Modern buildings to house the River Navigation Department and the Customs were constructed on the margin of the river Mandovi. In the main avenues, new poles were erected for electrification. A special programme for the arborisation of the city's avenues was also implemented.

By Order dated November 16, 1953, a new body with statutory powers named 'Comissao de Urbanizacao' was set

up in Goa, Daman and Diu, to control the urbanisation and constructional activities in the cities of the erstwhile Portuguese enclaves in India. An architect and an engineer were also deputed to Europe to get acquainted with the latest developments in the field of urbanisation.

On September 8, 1960, the Governor General, Manuel Antonio Vassalo e Silva, on a special session convened for the purpose, disclosed an ambitious plan of urbanisation of Panjim city. This development was conceived in a controlled manner, taking into account the existing cultural and traditional values and the future expansion needs which called for a comprehensive road network, open spaces and green belts, adequate zoning and planning regulations etc.

A note that touched the hearts of Goans was the appeal made by the governor on that occasion, to the residents of Panjim, inviting them to come forward with their valuable suggestions, so as to improve the plan.

One of the main features of the proposed plan was a long avenue similar to the Marine Lines of Mumbai, running from the old PWD building (Patto) till Dona Paula (NIO's location). While the plan was on the verge of execution, Goa got integrated in to the Indian Union, on December 19, 1961.

Suave and sedate type of architecture with marked Latin traits, houses running in straight alignment, white-washed walls, high windows and sloping roofs were the salient features of the houses of Panjim town. Apart from this, her clean avenues lined with trees and unhindered footpaths were adding grace to the city, once called the 'Princess of Mandovi'. In the beginning, she developed in a most candid way. She remained small, cut off and parochial, until suddenly caught up by the farsightedness of D. Manuel de Portugal e Castro (1826-35), who with bold determination and undeterred by acute shortage of funds embarked confidently upon the difficult task of converting partly swampy, partly sandy stretches into a potential area for the new capital of Goa. Though relatively small, Panjim, lapped and nourished by waters of the quiet flowing placid Mandovi river, grew with a distinct individuality and an old quaint charm that was quite fascinating.

Progress is inevitable and a generally desirable process in all human societies. Few would cavil at the improvements in the lives of the majority that recent developments have brought, but only the most insensitive philistine could fail to hope that, in the future, enough of the old charm of Panjim will remain to enable posterity to recapture the essence of her 150 years of history.

A year after the integration of Goa into the Indian Union, the Government of Goa, Daman & Diu published the 'Review of Activities (1962-63)', wherein it was mentioned that 'master plans for Panjim, Margao, Mapusa and Vasco-da-Gama were revised in conformity with latest thinking on town planning. A general plan for development of Panjim has also been drawn up.'

People in Goa, were, in fact, enthusiastic about the 'latest thinking' on town planning and were eagerly awaiting the developments in the offing.

After three years of protracted bureaucratic formalities, a Town & Country Planning Department was set up in December 1964. The old 'Comissao de Urbanizacao' was substituted by the 'Town Planning Committee'. The



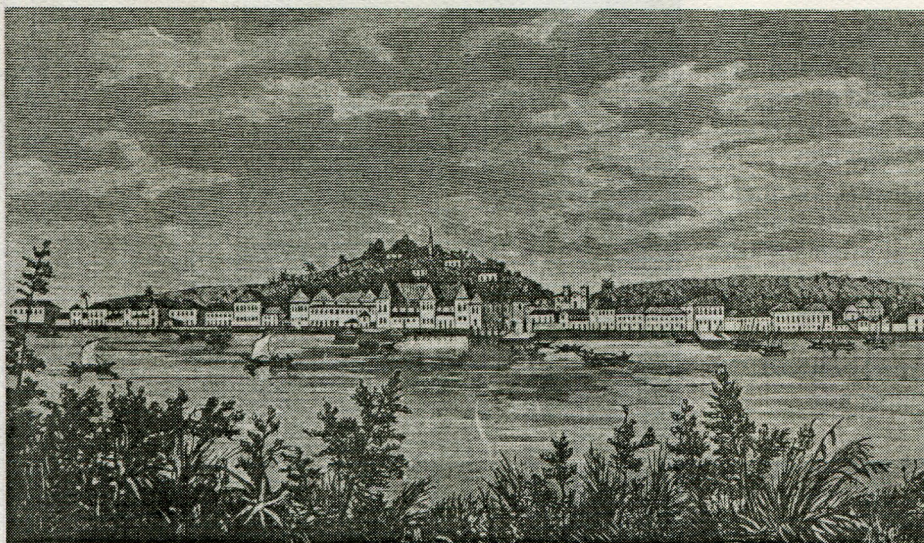
Signs of renewal: Boca the Vaca spring renovated

Committee was assigned with the responsibility of preparing Zoning Plans of Panjim, as well as 11 other urban centres and a few fast-growing village panchayat areas.

In 1965, the 'Goa, Daman & Diu Interim Building Byelaws and Zoning Regulations' were enacted. These were repealed when on 2nd April, 1976, the Goa, Daman & Diu Town and Country Planning Act came into force. For the successful implementation of this act, Government appointed a State Level Apex body, namely, the Town & Country Planning Board with a multiplicity of functions including the appellate functions arising out of the Planning Development Authorities' orders.

Earlier, in 1974, the Goa Government notified 17 planning areas including the Panjim Planning Area as a prelude to setting up Planning and Development Authorities (PDAs). The PDAs were to prepare (1) the Land Use Register, (2) the Outline Development Plan, and (3) Town Planning Schemes. They were also to exercise control and to execute various socially oriented schemes as well as remunerative schemes. 'As the Planning & Development Authority was not in a position to prepare the Outline Development Plan for Panjim Planning Area, this work was done by the office of the Chief Town Planner and the Statutory parts of the work carried under the directions of the Town & Country Planning Board.' (Report on the occasion of World Town Planning Day Celebration—November 6-7, 1987).

As can be seen from the above, it took more than two decades for the Goa Government to establish such an unwieldy multitiered planning machinery in the State. Also, during the period, an army of raw architects and planners debouched from largely mediocre Universities and with little Goan culture (save a few), made their way into the newly created setup.



Panjim city (1871)

The extremely rapid development which took place in Goa after liberation was reflected in the increase of population, more so in urban areas. In Panjim, the increase was as high as 48 per cent with consequent speedy urbanisation. In fact, around Panjim, new vast agricultural fields, coconut groves and rich cashew hillocks, at Campal, Gaspar Dias (Miramar), St. Inez, Portais, Altinho, Dona Paula and even at Morombim (beyond Ourem creek, where the bus stand and a commercial housing complex have come up), were soon bubbling with constructional activity.

The general orographic configuration of Panjim resembles that of a long tent when pitched on the ground. The extent of the top of the tent, is the ridge of the 'Conceicao Hill' running towards northwest direction and with her vast slopes descending suavely to the river Mandovi.

The planners of the old Panjim town took into account this factor while laying the drainage system in the early 1930s. It was perfect and never gave rise to any flooding during the rainy season. Now, after the advent of the multitiered Planning machinery in the State, this circumstance was totally overlooked. For instance, the long canal serving as storm water drain, starting from

St. Inez and passing through the Fire Brigade complex before emptying in the Mandovi river, was totally obliterated by a real estate developer. Similar was the case of another drain starting from the EDC complex and passing through Susheela Building (old Post-Graduate Centre). As a consequence, these are now flood prone areas. Also, while approving the housing colonies or developmental schemes in *khazan* lands, like those of 'St. Mary' and 'La Campala' colonies in Gaspar Dias, and at Morombim (Patto) near the present bus stand, no care was taken to check their level vis-a-vis the sea level. The

Reviews of Books on Heritage

• *Conservation in Goa: A Report to the Calouste Gulbenkian Foundation, Lisbon.*

by Ann Mytton, pp 28 (1984)

The report is the result of a field visit to study the issue of conservation of the urban environment in Goa. 'My brief was to look at both religious and domestic architecture and I assumed this to relate only to that of Indo-Portuguese origin,' says the author. She then describes the gradual destruction of conservation areas in Panjim and Margao. She examines both domestic houses and religious buildings, basically churches. She concludes the report by proposing an exhibition of Goan Christian art and ways and means of preserving important buildings like the Menezes Braganza house at Chandor. There has been no follow up to the report. An extract from the report, on houses, is given below:

'Domestic architecture in Goa is unique in style, a hybrid of East and West. Built in laterite with plaster rendering, the steeply inclined roofs covered in red Mangalore tiles, exquisite individual details of balconies and windows (no two houses are ever alike), colour-washed in ox-blood, ochre, sea-green, pale blue, cream and pastel pink, the curling floral plaster mouldings over door and window frames picked out in white, the substitution of glass by semi-transparent oyster shell in trellised window panes, give the town and village

houses of Goa, a distinctive character and beauty. This applies from the grandest to the humblest buildings.'

• *A Report on Conservation of Buildings and Sites of Historical and Aesthetic Importance.*

Government of Goa, Daman and Diu, 1987

The Government of Goa, on January 21, 1984, constituted a committee, to make recommendations regarding preservation of buildings and other sites, localities and places of aesthetic, historic or environmental importance.

The committee was asked to make a list of structures and sites of historical and aesthetic importance which it would be necessary to preserve. It was also asked to recommend preservation measures in respect of conservation areas and localities.

The eight member committee submitted an interim report in December 1984. It visited more than 1000 sites and buildings and submitted the present report in April 1987.

The report provides a brief history of the recent Portuguese control over Goa, particularly its built environment and then lists out its observations on buildings and sites visited.

It next examines controls for preservation and conservation areas and ends with several recommendations.

There are several annexures and lists of important buildings and sites of historic importance and a very large number of photographs, of buildings that need to be preserved. The report is an invaluable document for any person or institution interested in the conservation of period buildings and historic sites. It is bound to form the base for any future programme in this quest.

After the submission of the report to the government, the government brought in changes to the Development Regulations and incorporated provisions for specifically controlling and regulating development in areas that needed conservation. But by the end of the nineties, a new set of politicians with no interest in conservation whatsoever have taken charge of town planning, relegating conservation planning to the birds.

fate of these areas during the monsoons is common knowledge!

A city can, at its inception, be an act of aggression, a public relations exercise, even a piece of quixotic folly on the part of one individual. But once the new city is fairly stabilized, the dynamic towards growth and accretion that arises needs expert intervention and follow up by modern processes of *town planning* and *public health*.

Coming to the romantic Panjim, it is very sad that in a short span of twenty years or a little more, she had to suffer the physically traumatic insertion of large RCC blocks, designed with scant regard to the climatic and environmental aspects, in the place of sedate 'vivendas' of the old city. The high FAR permissible, without proper setback and parking space, is clearly a disruptive and despoiling force leading to haphazard growth like any other Indian town.

By an act of ignorance of the historicity of growth of Panjim, the once beautiful avenues of the city were done away with by permitting the use of columns over the footpaths. This insensible act narrowed the perspective of the imposing avenues, curtailed the growth of trees, created problems of encroachment into public space and prevented widening of roads, need for which could arise in future. In some places, side walks are so high that one has to literally climb on them and they are utilised either by vendors or as repair workshops for cars, scooters and cycles. Free and open pathways are fundamental needs in a city layout and their provision and construction does not call for high-level expertise. Presently, footpaths in the same street have different widths and different heights. Interestingly, the height varies from 22 to 60 cms! Maybe this is a new concept of the present planning machinery of the State?

When one speaks of Panjim city, it is difficult to dissociate the river Mandovi from her. If fact, the Mandovi is the life line of Panjim's economy.

Of late, the Government has carried out several schemes on the banks of the river which in the long run are bound to affect adversely the hydrodynamics of the river. At Old Goa, a little ahead of CHOGM jetty, there is indiscriminate dumping of large boulders for laying another jetty which has already come up. Large ferry ramps with concrete reinforcement jut out deep into the river. These are located at (1) Malim, (2) Betim, (3) near Fisheries jetty on Panjim side, and (4) two opposite the Electricity Department. A new jetty has also come up on the Betim side.

Two bridges have already been spanned over the Mandovi, linking Panjim to Malim. One out of these two, is a bridge reconstructed from that which collapsed on 5th July, 1986, leaving heavy RCC debris on the river bed. Besides these, another parallel bridge to the old Patto (Linhares) bridge, has been completed. All these put together exhibit 33 piers which have been sunk in the river.

Six years ago, to make good use of the debris of the fallen Mandovi bridge, the Goa Administration devised a scheme to fill up a large stretch of the margin of the river towards Panjim side, from Customs jetty upto old PWD, with a width of 14 metres.

In order to ease the transportation of materials for the construction of the new Mandovi bridge, the Uttar

Pradesh Road Development Corporation, laid a mini-dam throughout the breadth of the Mandovi river. This dam is yet to be removed and, ultimately, if not done, it will pose a great ecological problem.

Except in extreme cases, engineering skills provide for suspension bridges which are floated without damaging the river bed. We however are still lingering with obsolete designs and plans with heavy piers which ultimately are so damaging to the ecology of the rivers.

The dismantling of RCC bridges poses major problems as we have already experienced in the case of the old collapsed Mandovi bridge. The disposal of debris of such superstructures is also another problem, unless the PWD gets enough crushers and utilises the material for some other purpose. Otherwise, Goan rivers will be the eternal resting places of the RCC debris.

The river Mandovi is also getting silted at an alarming rate. Today, large deposits of silt are seen opposite the Menezes Braganza Garden, along the Patto (Linhares) bridge and several other places around Divar, Chorao, Vanxim islands and throughout the whole Naroa tributary. Continuous dredging is required to be carried out systematically to keep the river flowing.

In fact, the increasingly destructive pressure on the visual environment of Panjim is clearly noticeable and can be aptly described as a 'visual chaos'. It is in this context, that in the early 80s, a group of conservationists, environmentalists sociologists and ecologists (*not architects*) from the Goa Chapter of the Indian Heritage Society met together to discuss the ever-growing damage done by our planners and architects in various parts of the territory, particularly in Panjim. Fortunately, the then Governor of Goa, Mr. K.T. Satarawala, took keen interest in the matter and gave his wholehearted cooperation. He soon constituted a Committee to make recommendations regarding the preservation of buildings and other sites, localities and places of aesthetic, historic or environmental importance. In this Committee, besides the official members, four members were selected from the Indian Heritage Society (Goa Chapter).

The Committee after a detailed survey analysis made several recommendations which were included in the report. As a sequel to the recommendations made by this Committee, a 'Conservation Committee' was constituted for the conservation areas around Panjim, Margao and other places of historical/aesthetic importance.

Despite all the efforts towards conservation, Panjim city continues to groan, counting her days of doom. Slogans like 'development without destruction' and others are sounded time and again by the Prime Minister and all the Government agencies, but in practice, the Goa administration continues to disregard ecology and has failed to plan for harmonious growth.

Rapid economic development without ecological damage can be achieved if there is desire, will and capacity at the Government level. This can easily be achieved by subjecting developmental projects to an impact analysis based on principles of ecology.

It is unfortunate that with such haphazard development being carried out by the Government, the fate of the Princess of the Mandovi appears to be sealed.

Percival Noronha

ALTERNATE DEVELOPMENT PLAN FOR PANJIM CITY

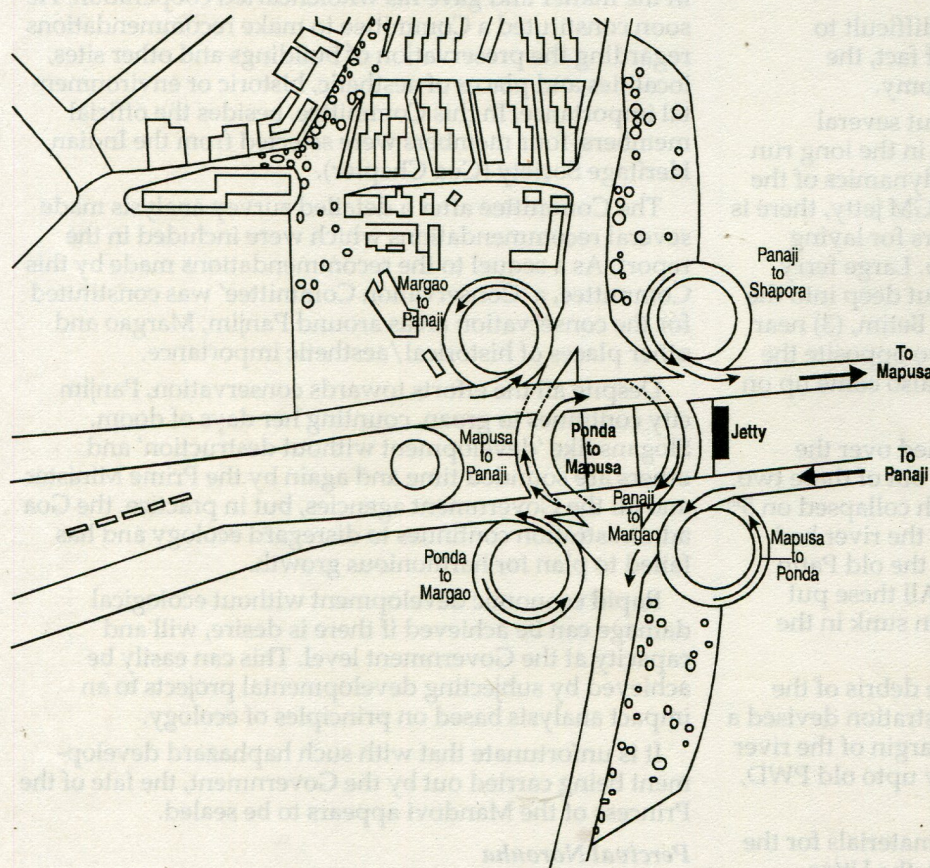
Among the well-known architects of Goa, Dean D'Cruz is known for his aesthetically pleasing, cost-effective and ecologically sensitive buildings. Apart from houses in Goa and elsewhere, Dean has also designed structures like the Nilaya Hotel at Arpora and the Thomas Stephen's Konkani Kendra, Porvorim.

He is also among those few architects in Goa who have taken an active interest in urban planning. As he points out, one cannot just go on constructing buildings without taking into account the surrounding environment. And when one finds that there are many problems with the planning of an area, one naturally wants to rectify them to the extent possible.

About the current status of urban planning, he says that what goes on under that guise is not really urban planning at all. There is no clarity of direction. ODPs do not examine the situation on the ground—classifications are arbitrarily applied without taking into account the basic nature of an area. Changes are made far too often (for obvious reasons, having little to do with planning considerations).

So what is to be done? Trying to correct the irrationalities of urban planning in Goa is a task which would scare off all but the most intrepid. Dean is clearly one of the brave as he has taken on the daunting task of preparing an alternative development plan for Panjim. In association with the People's Movement for Civic Action

Recreation of traditional four pillar entrance at Panjim main junction



(PMCA), Dean and his team have been working for the past three years on this project. He sees it as an ongoing project that will have to be continually refined. A brief glimpse of some of their suggestions regarding how the urban environment of Panjim city could be improved.

Pedestrian and Vehicular Movement — Panjim needs to sort out its movement of traffic, keeping the main thoroughfare on the river front and creating loops for vehicular movement to serve the distinct areas. Thus, there could be loops for Fountainhas, Altinho, the Central Business District, the market area and Campal, which could all feed from the river front road. Respect needs to be given to pedestrian movement and this should be allowed to pass through areas of heritage and open green space. There are a number of open green spaces which are bounded on all sides by roads, making it difficult for a pedestrian to use them. Traffic through these areas needs to be redirected, connecting these open spaces to pedestrian movement areas, reducing the amount of tarred surface for vehicular movement and at the same time increasing areas for parking. Since the network of roads in Panjim is fairly elaborate, with crossroads at very close intervals, there is potential for closing off every second lane for parking, thus freeing the most used roads for a free flow of traffic and keeping them free of parking.

River Network — Panjim is bounded by the River Mandovi and the Ourem creek that has been artificially trained to flow along its east side. As the city grew, pressure on it increased and the peripheral villages of Taleigao, St. Cruz, Mercedes and Bambolim all felt the pressure of natural expansion. Strong linkages in the form of bridges across the River Mandovi connect the city with Porvorim. As Panjim is the focal point of the neighbouring areas of Miramar, Dona Paula, Taleigao, Bambolim, Mercedes, Porvorim, Betim, Old Goa, Ribandar etc., we need to strengthen our river network. The river Mandovi adds character and identity to the city and if managed judiciously can serve the city with several landing stages along the waterway and possibly be used in future as an intercity and intracity mass transportation system connecting Panjim to Dona Paula, Betim, Narva, Aldona, Divar Island, Ribandar up to Old Goa; not to forget the Dona Paula to Mormugao connection. The continuous river front and the promenade also has the potential of being a well used active city space.

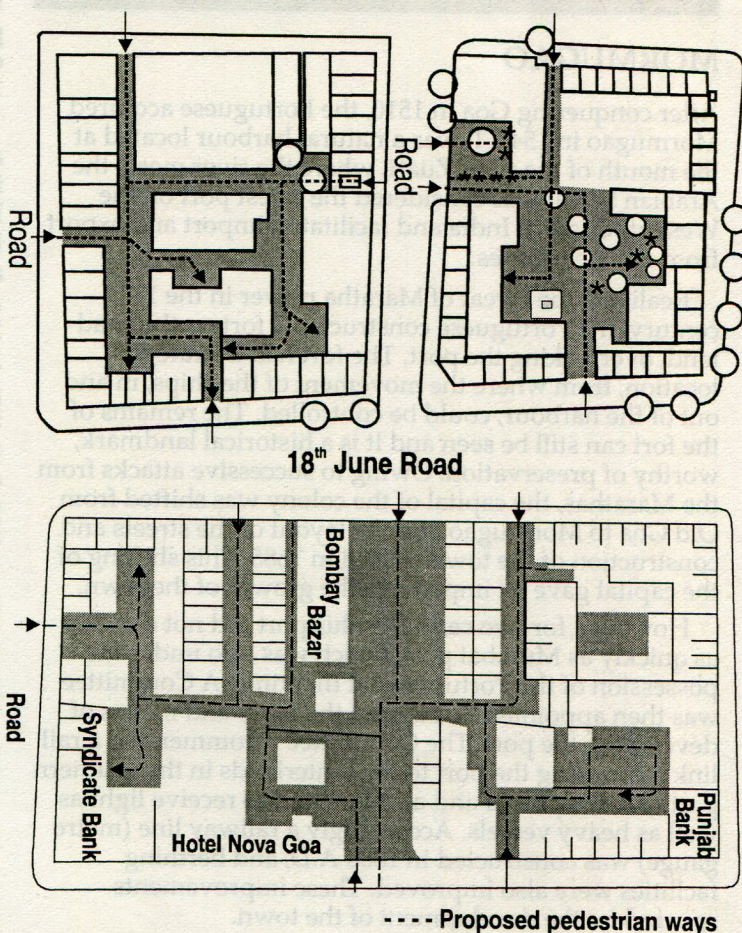
New Panjim Focus — The most used entrance to Panjim is now over the Patto bridges and this delicate connection is putting a strain on the entrance areas through which it passes. A number of facilities like commercial/cultural centres which concern Goa as a whole, and not just Panjim in particular, need to be kept outside. The Bambolim Medical Complex, the new Assembly com-

plex and other dormitory areas of Porvorim, St. Cruz, Ribandar, and the proposed twin city needs to have a new focus outside the city to prevent congestion of the already strained inner Panjim city. The area at the base of the bridges, touching the river front and stretching to the creek covering the Patto complex area seem to be ideal to be used for such a purpose. Here the transport node which connects the river jetty through a short walking distance to an inter and intra city bus terminus can form the core area. This core can be accentuated by the criss-crossing of the Panjim City to Ponda road and the Mapusa to Margao highway. An easy to use cloverleaf junction making use of the cross over height of the bridge, and incorporating the built form in its ramp, to cover its costs, would be a good working solution. The Four Clovers would also be representative of the historic Four Pillars of Panjim's old entrance.

Inner court spaces — In the Central Business District, besides the large open spaces accessible to the pedestrian, behind the straight lines of facades of buildings are a number of open beautiful court spaces which lie disused or underused as each is too small to provide parking for cars and as each plot has walled in this space. If a scheme to connect these inner courts could be promoted, the sheer commercial potential and market price of this valuable ground floor space would make the scheme a success, as this would offer shaded area and charming spaces for the public to shop and entertain themselves in.

Conservation — Panjim is not uniform in character and can be divided into 6 distinct zones, each unique. They are :

1. **Fountainhas:** It is a historic part of the city which has dense heritage buildings and thus the byelaws need to address the preservation of these buildings and their urban spaces with a view to protect them from the onslaught of vehicular movement.
2. **Altinho:** This area also has a number of heritage buildings and the vistas, open spaces and land with high gradients need to be fiercely protected and preserved.
3. **Central Business District:** It originally had a number of heritage buildings which deserved conservation but unfortunately their number is now dwindling and the character of the area is being quickly lost to the onslaught of a new, insensitive architecture. Public areas and plazas which still have architectural value like the area round the Secretariat, Azad Maidan the area in front of Govinda Building urgently need to be preserved, and the byelaws should prevent the faceless cold trend taking place along a number of major roads. A classic example is the road in front of Delmon Hotel.
4. **The Patto Complex:** The stress on just providing office buildings make the whole area dead, and there is a desperate need to incorporate commercial and cultural activity to enliven the area. Byelaws need to take into account its proximity to the bus stop and the creek.
5. **Campal:** This area of fairly low density has a number of heritage buildings and the byelaws need to preserve them, while addressing the proximity of the large garden areas and creek close by.
6. **Residential areas in and around Panjim:** These areas need laws that can prevent the exploitation of large tracts of land into enormous monolithic housing complexes,



Detail of proposed pedestrianisation on 18th June Road

encourage the development of distributed infrastructural nodes, markets, schools, etc., and thus prevent excessive pressure on the Central Business District. There is a desperate need to preserve open spaces which are needed as lungs for these quick growing residential areas. For example, Dona Paula is now devastated with construction and whatever little open spaces there were, defined by antiquated byelaws, have been usurped and views and vistas have been blocked by monstrous construction at the edges of the plateau. The byelaws for such areas need to address these serious problems.

Overall, there is a desperate need to reduce the FAR which now stands at a ridiculous, suicidal 2. Mumbai with all its density has an FAR of 1.33. Panjim is only 30% built up and already congested, and an FAR of 2 would make it unusable and unliveable. It is true that the Planning and Development Regulations were drafted with the assistance of the construction lobby. At that time, citizens' groups were nowhere around. That situation has now changed. It is time to demand a reduction in permissible FAR all over the city.

MORMUGAO

After conquering Goa in 1510, the Portuguese acquired Mormugao in 1543. It was a natural harbour located at the mouth of the river Zuari, where the river meets the Arabian Sea. It was considered the safest port on the Western Coast of India and facilitated import and export from other countries.

Realising the threat of Maratha power in the 17th century, the Portuguese constructed a fort on the headland, overlooking the port. The fort had a strategic location, from where the movement of the ships, in and out of the harbour, could be controlled. The remains of the fort can still be seen and it is a historical landmark, worthy of preservation. Owing to successive attacks from the Marathas, the capital of the colony was shifted from Old Goa to Mormugao and the layout of the streets and construction of the town started in 1685. This shifting of the capital gave an impetus to the growth of the town.

However, for two centuries this port did not develop as quickly as Mumbai port, which was also under the possession of the Portuguese at that time. A Committee was then appointed, to suggest the ways and means of developing the port. The Committee recommended a rail link connecting the port to the hinterlands in the southern part of British India and also facilities to receive light as well as heavy vessels. Accordingly a railway line (metre gauge) was constructed in 1888 A.D. and berthing facilities were also improved. These improvements spurred on the development of the town.

Residential areas started growing around the railway station in an unorganised fashion. To check this haphazard growth, the Portuguese Government established an Improvement Trust in 1920. The Trust planned the Central Area of the Town in isolation, without considering its linkages with other parts of the town and the rest of the territory. The town planning methods were influenced by designs of western towns, built after the industrial revolution. Construction of the town started in 1932. Only land required for public or semi-public use was acquired and laid out in a grid pattern, while the rest of the area was allowed to develop with a *laissez-faire* policy.

There was no significant increase in the handling of cargo from 1930 to 1950. The population of the town also remained stationary. It was only after the mining rush, from 1954 onwards, that the ore export totally rejuvenated the stagnant situation of the port, creating in the process a lot of employment opportunities. The population of the town increased from 11,714 to 20,464 in the single decade of 1950 to 1960—an increase of nearly 90 per cent. The liberation of Goa gave further impetus to this growth.

Vasco — Vasco city was once eulogised for its well planned and streamlined layout, with its shady avenues and broad, tree lined roads with ample footpaths. It was even chosen in 1684 to be the new capital of Portuguese India. But today Vasco city has the highest number of declared slums, e.g. Sada, Bogda, Non-Mon, etc. The city has a population touching 1,50,000 inhabitants.

Industries also play a big role in the economy of the area, particularly the port-oriented industries, such as iron ore export handling, barge building and barge

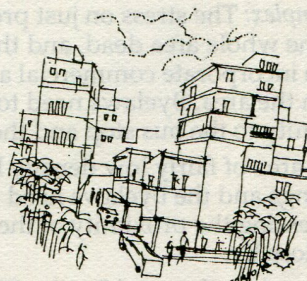
repairing units. According to the 1971 census, about 90 per cent of the population were employed in these types of industries—the figure has since risen to 94 per cent in 1981.

The big industrial enterprises within the planning area are the Zuari Agro Chemicals Fertiliser factory, situated in Sancoale village, the Reliance Salgaonkar Power Plant, Meta Strips, and the Goa Shipyard, within the municipal limits of Vasco. Other enterprises considered as industrial are actually no more than small to medium establishments, mostly located in the industrial estate at Zuarinagar, Sancoale and the southern bank of the river Zuari. The present road network within the region is not good enough to satisfy industrial entrepreneurs, who invariably seek efficient communication links with the rest of the territory. Lack of energy resources and non-availability of suitable land for development are also posing serious problems in the way of further industrialisation.

Growth in employment in the sector of trade, commerce, transport and other services has pushed up the percentage of workers in this sector from 90 percent in 1971 to 94 per cent in 1981. The role of industries, transport and other services have already been mentioned. The growth of trade and commerce will, however, play a significant role in the development of the area, only in so far as it caters to the increasing demands triggered off by the increased activities in the manufacturing and transport sectors.

Two reasons are forwarded in support of this: First, the planning area is relatively unattractive to tourists as compared with, for example, Tiswadi or Bardez talukas. Thus, the ancillary growth of trade, consequent upon tourism, will have, it is felt, no direct bearing on the planning of the area. Second, the major central place of markets in South Goa will obviously continue to be Margao, only 25 kms away. Thus, the scope for growth of the area as a regional market centre is limited. It will, however, thrive largely as a district market centre. Alternative centres of smaller dimensions and of lower hierarchy have been proposed in Sancoale, Cortalim and Cansaulim.

It is therefore expected that the main centre in Vasco and the auxiliary centres around, in Baina, Cortalim, Sancoale and Cansaulim, will become commercial centres of importance. Commercial activities consequent to the start of new industrial units in Sancoale, especially in the proposed Export Promotion Zone, will boost the development of these centres and give them further hinterlands to draw their commercial resources from.



MARGAO

Located at the foot of a lateritic tableland, Margao, which has a population of almost a lakh, is the natural centre of Salcete taluka and South Goa.

It was once a major religious centre of Goa in which several important temples were located. The Portuguese, during their early rule, destroyed not less than ten of these.

Today, Margao is generally referred to as the cultural and commercial capital of Goa. But its environment is steadily and rapidly deteriorating, with a corresponding decline in the quality of life of the people of the once beautiful town. Some urban planners are ready to concede that the town is now beyond hope and repair.

This was not always so.

Earlier, development of the town was along planned lines such as high and low density residential areas, a main central commercial zone and a local commercial zone. Schools had their special location. The overall townscape, made up of the buildings, both singly and in groups, the streets, the squares, and the shopping arcades, gave the town a distinctive individuality. Being low-scaled, they engendered a particular life-style in the different zones.

Ironically, most of this is now being undone by the menace of 'planning', which is governed more by the award of lucrative tenders for development schemes and questionable permissions to developers, than by public interest.

The result is that Margao has become quite a nightmarish town, especially during peak hours, with highly anarchic and threatening traffic. The central town area has become quite a dangerous zone, both for children and older people.

Several efforts have been made by people to reverse the state of affairs. Many have failed, simply because not too many people have come forward to join the campaign to save this town.

In 1985, for instance, 16 Margao architects wrote to the President of the Margao Municipal Council, pointing to

the deterioration of the town's environment. The letter emphasized several points, including cleanliness, discharge of waste by restaurants, public toilets, the fish market, open drains, frequent digging of roads, construction sites and service garages and the pollution they generate. The group made detailed suggestions in regard to treating each of these problems.

The group, with great foresight, also lobbied for more pedestrianisation of the town (a standard policy now in many advanced countries—with the car being banished from inner city areas) and for more greening of the area.

In a letter, in 1987, the Margao Architects' Action Group provided detailed comments on the town's Outline Development Plan, building byelaws and planning regulations. The letter placed the blame for the deterioration of the town on the high coverage and floor area ratio permitted and argued for a drastic reduction. 'The pressure to keep the FAR high is from the developers and some of the property owners,' wrote the architects. 'But these together, number, at the most a few hundreds, while the ill-effects of the present regulations, which are already glaringly noticeable, will be felt not only by the thousands who now live or frequent Margao, but the thousands and thousands who will use it in the future.'

The letter also drew attention to the fact that though multistoreyed apartments were being permitted on the pretext of solving the supposed housing shortage, a survey undertaken at that time revealed that more than 400 new flats, though sold, were unoccupied, whereas the housing needs of the migrant labour who accounted for much of the population growth were definitely not being met by the multistoreyed buildings. Arguing that most of the new population requirements upto 2001 AD could be met by permitting just a ground and one upper floor within the existing settlement areas, the architects ended by saying they were 'guided in their letter not only by their deep concern for the town and the welfare of their fellow townspeople, but equally by their responsibility to the community, as members of the architectural profession.'

The architects' group also went on to make several proposals for the conservation areas of the town, after members had made a detailed inspection of the areas.

The Planning and Development Authority (PDA), which was set up under the Town and Country Planning Act, 1974, to plan the development of the town and its surrounding areas, turned out to be a money-collection agency, with highly corrupt officials using their position to loot public funds wherever possible, before their removal or a change in dispensation.

If the planning authority sets the lead in destroying the environment, how can one blame the rest of the citizenry of the town?

Margao area (1871)



PONDA

It may seem astonishing, but there was no village or town named Ponda in the cadastral survey map of Goa, published in 1905. Most of the area, today known as Ponda town, was a part of 'Aldeia de Queula' (Queula village). Ponda did not exist as a separate entity—either as a Comunidade or revenue village.

Durbate—a village adjacent to Queula (Kavalem), being on the bank of the Zuari, was the main business centre. The population of Durbate and Wadi was greater than that of Ponda till a few decades back. Rice, oil, flour mills, handlooms and similar activities were handled in large volumes in Durbhatwadi rather than in Ponda.

Thus the original settlement associated with the area today called Ponda must have been basically of farmers, cultivating paddy along the *nallah* passing through the town. Political significance came to the area by the construction of two fortresses, 'Kot' and 'Mardangad'. Today, even the ruins of these are difficult to find. A few Muslim families settled in the 'Kot' area during the regime of Adilshah, while Farmagudi, the highest hill in the area, secured its place in history on account of the military action of the Marathas. Today, this is symbolized by the statue of Shivaji. Zingri-Mal is another open area on the outskirts of the town—now virtually part of the town—which is reported to have witnessed a furious battle.

Ponda became an administrative centre once the Portuguese Government established its taluka offices here, especially those of Mamlatdar, Court, Municipality (earlier the Municipality covered the entire taluka) and post office. A bi-weekly bazaar was also started. This gave rise to commercial activities connected with consumer needs, including trade in the agricultural produce of the area. The Vaishya community dominates the area around the bazaar area even today.

By this time, road transport advanced, with the main Panjim-Margao road passing through the town. Ponda was also connected to the Belgaum route. This was the main trunk road of Goa. It is with the development of these roads that the importance of Durbate (served by river navigation) naturally declined.

Ponda nallah polluted with sewage and garbage



Out of the three Vedic pathshalas of Goa, two were in Kavalem village. With this educational background, the late Dada Vaidya pioneered modern English education with the formation of the Goa Vidya Prasarak Mandal. The high school which was first located at Kavalem in the Kapileshwar Temple *agrashala* was soon shifted to Ponda and became the A.J. de Almeida high school. This school soon became part of the identity of the town.

The first industry to come up was the Matches Goa Private Limited, formed a decade prior to Liberation, for manufacture of matchsticks.

Multifaceted, multi-pronged development activities received a spurt after Liberation. The growth of the town further accelerated with the coming of the Madras Rubber Factory (MRF) plant at Khandepar. Shortly thereafter, the industrial estates of Kundai, Bethora and Usgao developed around the town.

Ponda was now getting rapidly urbanized. Its cooler climate, better supply of piped water, and easy accessibility to other parts of Goa, due to its central location, gave it a certain attraction. A fresh wave of people, mostly Hindu, now preferred to settle here.

Sometime ago, I wrote an article 'Ponda Getting Devastated' in the local press. However, even then I had no inkling that what I feared could happen so fast. The population of Ponda has doubled within the last decade. In 1992, I again wrote a series of articles on the town—'Ponda Under the Curse of Development', 'Death of a Lifeline' and 'Reconstruction of Ponda', all highlighting the ills of unplanned development, which, if unchecked, destroys the identity of a place, leaving it characterless and chaotic.

Goan cities have their individual characteristics. The approach to the city of Panjim, for example, from three sides along waterbodies gives it its charm.

Similarly, Ponda has got its identity from the entry roads from Khandepar, Ponda ghat and Margao.

The Khandepar road winds through deeply wooded hills and thick green areca garden valleys. The landscape opens with a picturesque topographical art work of paddy fields providing Ponda with its green appearance at the gates to the town.

While coming from Margao side you take sharp turns through wooded areas, areca gardens and the government forest of Mardangad. Approaching from Old Goa side, kilometres of road (now devastated by bulldozers) run in serpentine fashion with green hills on one side and the long stretch of areca *kulagars* of Priol on the other side.

When you reach Farmagudi, the statue of Shivaji and the distant towers of the temples of Kavalem and Bendiwade against the verdant hills provide the cultural character of the Ponda community.

I have suggested a number of ways of putting Ponda's natural assets to urban use and simultaneously conserving them. As a model, we have developed one spring named as 'Hanuman Teertha', which is a beautiful spot to visit. At the same time, the number of users has been trebled—nearly 200 a day for drinking water, bath and washing.

Ponda's identity is also derived from the number of perennial springs and *nallahs* which wind their way through the town with an informal art work of lush green

patches of paddy fields, wooded areas and folded topography. The *nallah* is a single drain for about twenty sq kms of rain water catchment.

The *nallah* was once used by people for bathing and washing and for swimming by teenagers during the summer months two decades ago. Now it is slowly turning into a gutter. Effluents from a beer factory, waste water from the military establishment and urban waste is running into the stream.

With the depletion of vegetation, cutting of the land forms, reclaiming of paddy fields and the silting of the *nallah*, flash floods are routine during the monsoon. During the monsoon of 1992 one house, two bunds and one culvert were washed away. Now entry of flood waters into houses and shops is becoming a regular feature.

The *nallah*, however, with proper planning, can be developed as a beautiful element of Ponda's urban landscape.

Today Ponda's development is linear. In terms of town planning, this is called 'ribbon development'—a defective pattern of development. With the National Highway 4A passing through the heart of the town, with transport of highly toxic and hazardous chemicals on the roads, a highway bypass has been the demand of the town for the last two decades. Instead of constructing this essential road, crores of rupees have been spent in bulldozing the green area of Priol as part of highway straightening, a task that was not a priority on any count. Now one bypass on the Panjim Ponda-Margao state highway is complete and is in use. The other two are in progress: Panjim-Belgaum National highway 4A and link between NH17 and NH4A from Margao to Ponda. Here again politics and personal interests have played a big role, the alternative which was cheaper and shorter and less damaging to the ecology has been given up. As per affidavit of Under Secretary (Revenue), Government of Goa, filed before the high court which was based on the expert committee of PWD executive engineer, the earlier road suggested by the Town Planning Department would have saved the public exchequer Rs 80 lakhs, and would have required the felling of only 50 trees as against 500 trees in the alignment proposed later. In spite of this, the vested interests succeeded in getting the most damaging alignment executed.

As per the Zoning Plan of Ponda prepared in the early seventies, the highway and bypass were supposed to act as ring roads of the town. The town was planned to be contained within this ring road with 75 m green zone on both sides to act as a green buffer from highway hazards and also for better management of the town population. Due to nonexistence of any statutory plan, or rather noncompliance of the guiding zoning plan, the town has grown out of bounds and one of the bypasses—the National Highway Bypass—is crossing through the newly developed settlement area. Land has been acquired for development at Dhavli, falling beyond the State Highway bypass defying the planning strategy of stopping the town development at the highway.

It is simply not true that to cater to increasing population, one needs to colonise more land for development. A rough study made by me five years ago showed that at least 70 per cent of Ponda's population lives on the



New type construction of concrete jungle at Ponda

ground floor. This means that Ponda could house double its population, by allowing just one additional floor in all existing settlements.

Recently Ponda has become a town of labourers. Thousands of labourers from Karnataka, Andhra and other states stay mostly in the northern part of the town and converge to the central most critical part of the town every morning. Contractors from different parts of Goa come and pick them up. Central Ponda is totally congested. Slums are growing and where is the provision for sanitation? What provisions are made in the Ponda Municipal Council's Rs 4.8 crore budget for such developments? It is a matter of research.

Half of Ponda has grown into the adjoining villages of Kavale, Bandora and Curti. But the Municipal Council administration works within the old limits only. Even the bus stand of the town is outside the Municipal area. Like other towns Ponda does not have a place to dump its garbage and is now dumping its solid waste on the northeast side of the adjoining village and the liquid waste flows through the *nallah* to the village on South-West. If a sewage treatment plant is to be installed, there is no place in Ponda town for it. The trucks bringing cargo to the town have no space in the town to park. Planners and administrators need to acknowledge that the town has grown beyond the earlier limits. This additional area needs to be urgently made part of the town for purposes of planning and administration.

K. D. Sadhale

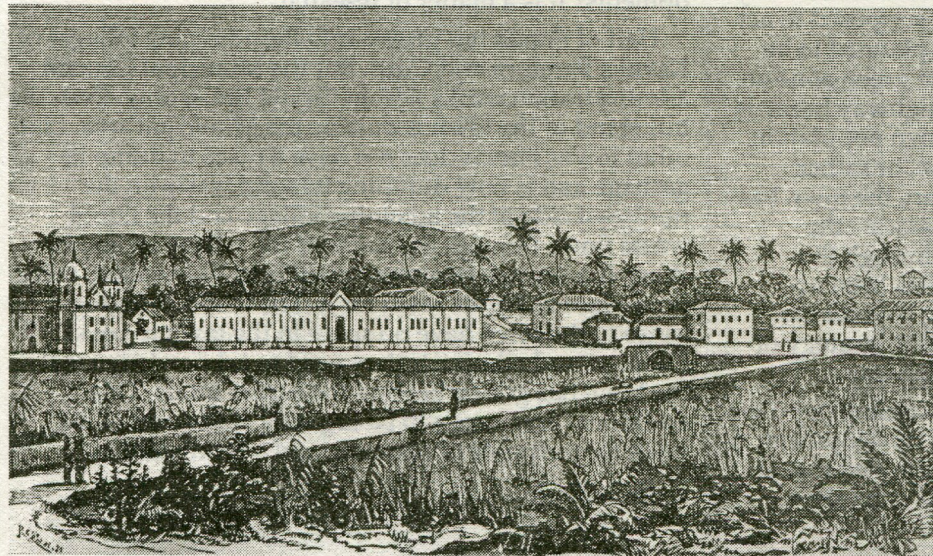
MAPUSA

According to one tradition, Mapusa takes its name from 'maap'—measure and 'sa'—to fill up. In other words, a place for measuring and selling goods. An appropriate name for the commercial centre of North Goa with a population of more than 30,000 people. Mapusa, the nerve-centre of Bardez and the main transit point to North Goa traffic was considered as 'the most important commercial place in the whole territory of Goa', according to Jose Nicolau Fonseca (*An Historical Sketch of the City of Goa*, published in 1878). However, 'originally Mapusa was not only not the head village of Bardez, but not even included among the elite villages,' say J Patrocinio de Souza and Alfred D'Cruz in another book (*Saligao*, 1973). Only when the Camara Geral de Bardez (located then at Serula) was replaced by a Municipal Council at a central location in the nineteenth century, did Mapusa rise in the hierarchy to wrest the seat of Bardez taluka from Serula village.

Basically, Mapusa functions as a market centre for merchants from the adjoining talukas of Sattari, Pernem and Bicholim. Its celebrated institution is the weekly 'Mapusa Bazaar' every Friday where a whole range of interesting commodities from dried fish to machine tools are available on sale. A large number of tribals participate in the exchange and more than 50 per cent of the sellers are women. The *bazaar*, considered to be Goa's best planned market, is located in a market complex built during the time of the Portuguese and closely associated with the name of Dr Antonio Pinto do Rosario.

Besides the market, there are two historical institutions associated with the town. One is the church of St. Jerome, popularly known as the Milagres Church. It was built in 1594 on the ruins of the chief pagoda, whose idol was shifted to Dhargal in Pernem. Later destroyed by a fire in 1779, it was rebuilt in 1838. Catholic as well as Hindu devotees gather in large numbers to pay homage to *Milagres Saibin* (Our Lady of Miracles) and to celebrate the ensuing feast. The accompanying five-day fair with an overwhelming abundance of all types of household furniture is also very popular. The Hindus consider the *Saibin* as the eldest sister of seven Hindu Goddesses (see

Mapusa scene with chapel (1871) near present day police station



article in *Eco-Traditions*). The feast precedes the famous Sirigao Zatra (fair) of Goddess Lairaee—another of the seven sisters—by a couple of days.

The other is the Bodeshwar Temple dedicated to Kanokeshwar Baba and popularly known as *Bongini*, the God of Vows. The *zatra* associated with this is held in December or January and is celebrated with great fanfare with the entire place lit up with stalls.

Mapusa, like Margao, is located at the base of a lateritic plateau. The older part of the town is along a linear plan, adhering close to the hill base. The town is now sprawling over slopes and the top of the plateau and through the narrow gap across the agricultural fields which carries the national highway. The town is bounded on the east by the Mapusa river, which is a tributary of the Mandovi river.

The cumulative effect of industrial growth, which gained momentum particularly since 1975 after the setting up of the town's two industrial estates, Mapusa and Tivim, has drawn a large influx of people from the Bardez suburbs as well as migrant labour from neighbouring states.

The major environmental pollution of Mapusa is related to its drainage which is largely open. Civic amenities, as in most cities, have not kept pace with Mapusa's needs. Public toilets, few and far between, are hardly maintained properly and the open drains mostly remain clogged. During the monsoons, much of the pollutants are naturally carried down into the agricultural fields.

The other major problem relates to the management of the town's garbage. For years now, the town used to ferry its wastes to the top of the hill and dump it at a dump site (illegal, of course) just outside the Goa Housing Board Colony. Later, the MMC acquired the land under the Land Acquisition Act from the Comunidade of Assagao. It also paid Rs 15 lakhs to the Land Acquisition Officer towards the cost of the land. In July 2000, Chief Minister Parrikar issued orders for the dump to be permanently closed! The MMC made attempts to dump the waste in Colvale. It faced stiff opposition from Colvale villagers. Thereafter, the MMC has been transporting its wastes daily to the Curca site in Tiswadi, a distance of more than

15 kms! The MMC is now waiting eagerly for acquisition of a site at Saligao, but Saligao villagers have already raised the banner of protest.

Even the once admired municipal market, which has since been extended, hardly lives up to its reputation as Goa's best shopping area.

In the meanwhile, big developments are planned for the town. The Outline Development Plan has been finally approved and it has released about 57 ha of land south of the Municipal Market. This area is to be released for high density commercial zone. Already, the roads and other infrastructural facilities are unable to cope—what the impact of such a development will be remains to be seen.

CONSERVATION OF BUILT HERITAGE

According to Percival Noronha, it was only after World War Two that the words 'conservation' and 'preservation' came to have any serious meaning in Goa. Noronha writes that in 1948, a special team headed by Balthasar de Castro, a well-known architect, conservationist and Director-General of the Archaeological Department of Portugal, arrived in Goa to survey, document and restore the monuments in Old Goa. The team also took up the restoration of the dilapidated chapel of St Catherine and the church and convent of St John of God, also in ruins.

The Arch of Viceroy, which had already collapsed, was restored in 1954.

After Liberation in 1961, the care, restoration and maintenance of these ancient monuments passed over into the hands of the Indian Government which brought into force in Goa the Ancient Monuments and Archaeological Sites and Remains Act, 1958, under which 18 important monuments were listed (*see List 1*).

Another 42 sites were declared as protected monuments under the Goa, Daman & Diu Ancient Monuments and Archaeological Sites and Remains Act, 1978 (*see List 2*).

Of course, apart from these sixty protected monuments, there were several other buildings and areas that needed to be conserved and protected. The Government of Goa thereafter constituted a Conservation Committee headed by the Development Commissioner. Its terms of reference were to make a list of structures and sites of

historical or aesthetic importance which need preservation; and to recommend specific preservation measures including controls on land use and building norms.

Much of what is related below comes from the Committee's excellent report.

It noted that the churches of Goa are invaluable specimens of old Portuguese architecture: their interiors carried elaborate woodwork, furniture, pulpits and altars which required to be preserved.

It observed that monuments that were protected had been taken in for restoration, but concluded that the restoration work had not been able to achieve the desired objectives due to poor quality of work and thoughtless use of material and colour at places. Some monuments had actually been disfigured as a result of the apparently crude efforts at restoration or alteration. Examples of such inappropriate alterations were the addition of RCC porticoes, paintings on ceilings and unsuitable structures within church squares.

It also noted that several structures and sites were suffering from neglect and needed immediate repairs.

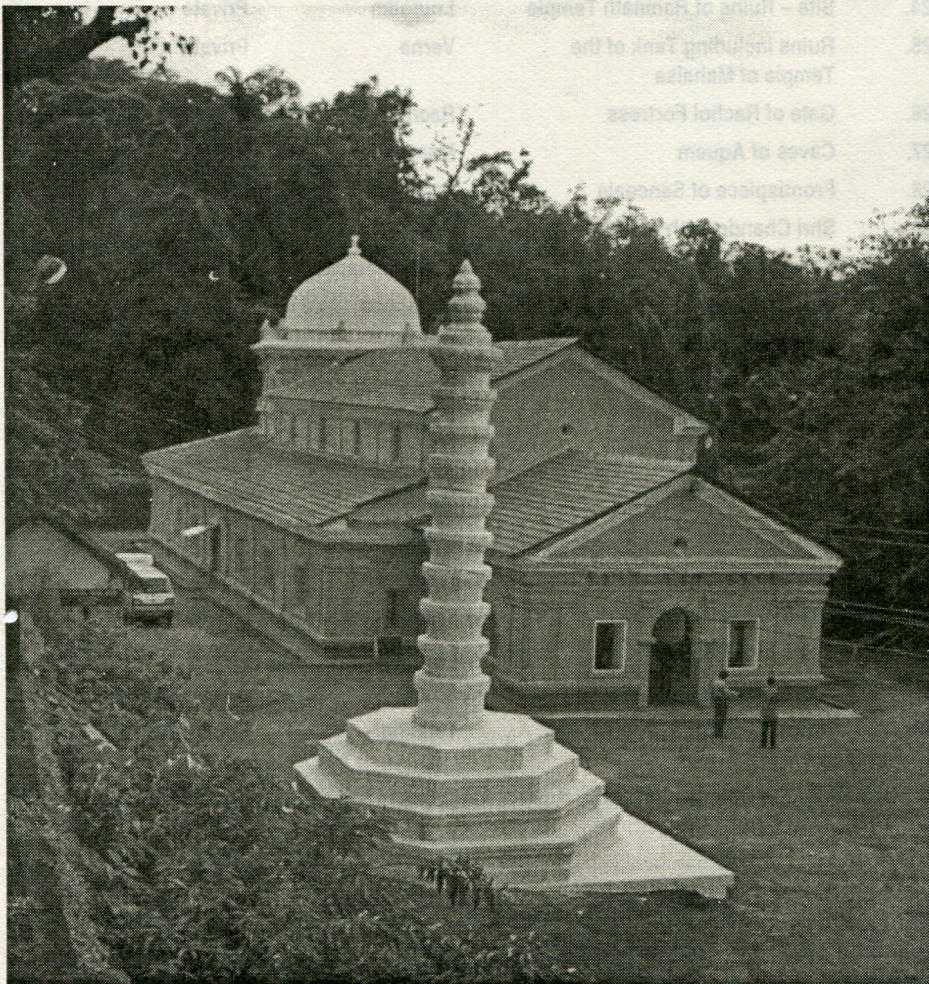
The Committee observed that the architecture of several private houses is worth preserving for their imposing house fronts, high plinths, entrance porches, designed railings, detailing on cornices, compound walls and Mangalore-tiled roofs. Such private houses are also storehouses of rare furniture and art objects preserved for generations. The Committee listed the following houses:

1. House of Menezes Braganza at Chandor, Salcete
2. House of Rauraji Deshpabhu at Pernem
3. House of Dr. Alvaro Loyola Furtado at Chinchinim, Salcete
4. House of Dr. Eurico DaSilva at Margao, Salcete
5. House of Dr. Armando Alvares at Margao
6. House of Vicente Joao Figueiredo at Loutolim
7. House of Adv. Pedrinho Gonsalves, Guirim, Bardez
8. House of Prof. Teotonio Alemao at Betalbatim, Salcete

As per the Goa Ancient Monuments & Archeological Remains Act, the Government is duty bound to notify houses of historic/aesthetic importance which are more than 100 years old so as to enter into an agreement with the owners for their preservation. This has not been done.

There is a second category of houses which are internally attractive and due to their location contribute to the general attractiveness of towns and villages. Zoning regulations could be relaxed but there would be no change in the external appearance of the house and they could be used for restaurants or local commercial purposes.

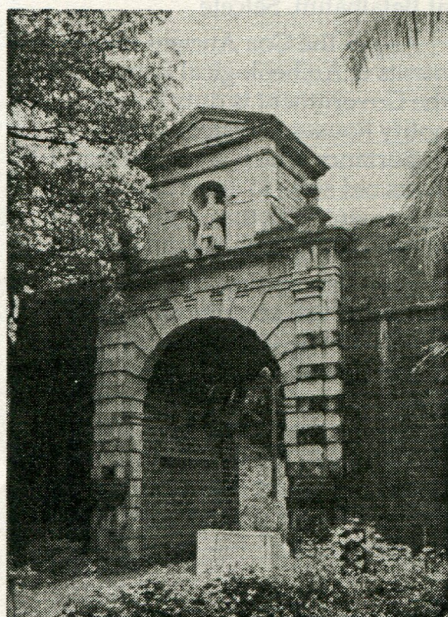
Shree Saptakoteswvar Temple at Narvem after architectural restoration by Fundação Oriente



Protected Monuments (List 1)

Sr. No.	Name of the monument
1.	Ancient site of Chandrapura at Chandor
2.	Ruins of the Fort and Palace of the Kadambas in Goa-Velha
3.	Rock-cut caves at Arvalem
4.	Ancient temple at Tambdi Surla
5.	Arc of Viceroy and ruins of fortification wall in Old Goa
6.	Church of St. Caetano in Old Goa
7.	The Church of St. Francis of Assisi in Old Goa
8.	The Cathedral of Holy See in Old Goa
9.	The Basilica of Bom Jesus in Old Goa
10.	The ruins of a Convent of Augustinians near St. Monica's
11.	Convent in Old Goa
12.	Portal and ruins of St. Paul's College
13.	The Naguesh Temple at Bandora
14.	The Mahalasa Devi Temple at Mardol
15.	The Shantadurga Temple at Quela
16.	Sarva Masjid with masonry tank and other structural remains at Ponda
17.	Church of the Rosary in Old Goa
18.	Shantadurga Temple at Naroa
19.	Ruined Temple including the adjacent rock-cut cave at Kurdi.
Notified under the Ancient Monuments and Archaeological Sites and Remains Act, 1958	

Arch of Viceroy



Protected Monuments (List 2)

Sr. No.	Name of the monument	Village	Ownership of monument
1.	Ruins of Brahmapuri	Ella	Private
2.	Chapel of St. Xavier	Ella	Private
3.	Chapel of Our Lady of Monte	Ella	Private
4.	Convent of St. Monica and Chapel	Ella	Private
5.	Ruin of College of St. Populo	Ella	Private
6.	Church of St. Peter	Ella	Private
7.	Casa da Polvora	Panelim	Government
8.	Fort Naroa	Narao Divadi	Government
9.	Site of the temple of Saptakoteshwar	Narao Divadi	Private
10.	Church of St. Anne	Talaulim	Private
11.	Chapel of St. Jeronimus	Madel Chodan	Private
12.	Site where the ancient image of Buddha was discovered at Colvale	Colvale	Private
13.	Fortress of Colvale	Colvale	Government
14.	Reis Magos Fort	Reis Magos	Government
15.	Church of Reis Magos	Reis Magos	Private
16.	Chapora Fort	Chapora (Kaisuv)	Government
17.	Caves at Naroa	Narao	Private
18.	Temple of Saptakoteshwar	Narao	Private
19.	Site of Gujir	Kudnem	Private
20.	Fort of Sanquelim	Sanquelim	Private
21.	Namazgah	Bicholim	Private
22.	Site of Ruins of Manguesh temple	Cortalim	Private
23.	Site - Ruins of Shantadurga Temple	Quelossim	Private
24.	Site - Ruins of Ramnath Temple	Loutolim	Private
25.	Ruins including Tank of the Temple of Mahalsa	Verna	Private
26.	Gate of Rachol Fortress	Rachol	Private
27.	Caves of Aquem	Margao	Private
28.	Frontispiece of Sancoale	Sancoale	Private
29.	Shri Chandranath Paroda	Paroda	Private
30.	Cabo da Rama Fort	Cabo de Rama	Government
31.	Shri Mallikarjuna Temple Shreesthal	Canacona	Private
32.	Caves at Rivona	Rivona	Private
33.	Caves at Khandepar	Khandepar	Private
34.	Cave at Ishwarbhat	Khandepar	Private
35.	Cave at Mangueshi	Mangueshi	Private
36.	Shri Naguesh Temple	Bandora	Private
37.	Shri Kamakshi Temple	Shiroda	Private
38.	Shri Saptakoteshwar	Khandepar	Private
39.	Shri Mahadeva Temple	Agapur	Private
40.	Ruins of Jaina Basti	Bandora	Private
41.	Fort of Alorna	Alorna	Government
42.	Fort of Terekhol	Terekhol	Government

Notified under the Goa, Daman & Diu Ancient Monuments and Archaeological Sites and Remains Act, 1978

The Committee also went into a number of other sites and structures, including bridges, caves, forts and pergolas. It looked at springs like those at Boca de Vaca, Fontainhas, Curca, and recommended that some of these sites should also be notified under the 1978 Act.

The Committee also identified several important government buildings whose external facade needs to be preserved and to which no addition or alterations should be allowed:

1. Asilo, Candolim
2. Asilo, Mapusa
3. Administracao das Comunidades of Bardez, Mapusa
4. St. Mary's High School, Mapusa
5. Civil Court, Mapusa.

Apart from individual monuments and buildings, the Committee also examined two classes of heritage areas called Preservation areas and Conservation areas. Preservation areas are to be kept as far as possible in the present form with no alterations or development. Originally an area measuring about 100 hectares in Old Goa, around the Basilica of Bom Jesus was identified as a Preservation Area. Some of the significant sites and monuments are listed below:

1. Convent of St. Cajetan
2. Viceroy's Arch
3. Se Cathedral (St. Catherine's Church)
4. Convent of St. Francis de Assisi
5. Basilica of Bom Jesus
6. Convent of St. Joao de Deus
7. St. Augustine's Tower
8. St. Anthony's Chapel
9. Convent of St. Monica
10. Church of Our Lady of Rosary.

The Committee proposed that many areas in the urban setting would be set aside as Conservation zones. Here special measures are required to be taken to preserve the general character and appearance of the area while some development may be permitted to improve the environment and to keep the structures in good condition.

Besides these, the old areas in the major towns of Panjim, Margao, some villages and areas around churches and temples, and sites of scenic beauty, were identified as conservation areas and 17 such locations were identified of which 7 are in Tiswadi, 4 in Bardez and 6 in Salcete.

In such cases, while internal modifications would be allowed in the existing structures, exterior appearance and height of buildings would not be changed.

Specific byelaws and rules for buildings in such areas would have to be framed. The Committee recommended that Government should prepare a phased programme of acquisition of land and special zoning regulations in relation to proposed Preservation areas. These would include restrictions on widening of roads.

The Committee made several recommendations in its report which require a compilation of lists of buildings to be notified which are of special architectural or historical interest in the 1978 Act. It recommended that 7 buildings should be notified as protected monuments under the

1978 Act in addition to those which have already been notified.

It also identified 7 springs which needed to be protected in addition to the forts and caves and recommended that all these should be made into attractive tourist spots which would bring them out of their present neglected state.

The Committee on Conservation also felt that the existing municipal byelaws and panchayat regulations would not be able to arrest the deterioration of heritage/conservation areas. A new set of building control considerations with area-specific individual regulations had to be developed.

Some of the primary features would be that there would be no demolition, change in land use or FAR, without the consent of the Chief Town Planner. There would be a control for new development so that in all aspects it would be as per the special character of the existing development of the zone and there would be a control on hoardings. The Committee also recommended several development controls, architectural/building controls which needed to be enforced. Finally, the Committee recommended that conservation functions should be specifically assigned to various agencies.

The preservation of the 18 sites notified under the Central 1958 Act should be with the Archaeological Survey of India whereas the maintenance of the 42 monuments and sites notified under the Goa Act, should be with the Director of Archives. It further recommended that non-government agencies like INTACH should be involved in the conservation efforts.

Despite this Committee's recommendations, the scenario relating to preservation and conservation has been quite depressing. Specific conservation committees set up by different PDAs have continuously submitted to pressures from private owners and have in several cases allowed development proposals in conservation areas that completely alter the outward appearance and character of such places.

In fact, the previous Planning & Development Regulations allowed demolition of structures existing in conservation areas which is something that is quite absurd. The new Planning & Development Regulations which have come into force recently do not even have a chapter on Zoning Regulations for conservation areas, which is an indication of the extent to which PDAs are committed to conservation issues.

As a result, NGOs have recently had to move the High Court to challenge approvals granted for buildings in conservation areas that intend to completely alter the inherent character of such areas.

Conservation of World Heritage Monuments in Old Goa

The monuments of Old Goa represent an important architectural landmark of the sixteenth and seventeenth centuries in Goa. In them, the classical canons of western art—unity, coherence and harmony—are reproduced in every specimen, transcending the bounds of idealism and delights of extravagance of the bygone period, leaving to posterity a dream of grandeur of the past.

In 1964, prior to the Exposition of St. Francis Xavier, the Government of India took special interest in these monuments and extended 'The Ancient Monuments and Archaeological Sites and Remains Act, 1958' to cover them. From then till date, the conservation management of the following important monuments is in the hands of the Archaeological Survey of India (ASI), which has its branch office in Old Goa:

1. Arch of Viceroy
2. Church of Our Lady of Divine Providence attached to the old convent of St. Cajetan (now Institute Pius X)
3. See Cathedral
4. Chapel of St. Catherine
5. The old convent of St. Francis de Assisi
6. Church of Holy Spirit
7. Basilica of Bom Jesus
8. Remains of the Church of Our Lady of Grace and the ruins of the convent of St. Augustine
9. Chapel of Our Lady of Rosary, and,
10. Ruins of the old Church of St. Paul

In 1972, UNESCO adopted a resolution for the identification and protection of the World Heritage in natural and monumental form. In 1977, India became an active member state on the World Heritage and holds fifteen World Heritage Monuments (the group of churches in Goa is one of them), and four natural sites.

It is regrettable that the conservation of architectural heritage in India is yet to become a professionally managed task. In fact, it is an unfamiliar discipline among the ASI's so-called professionals. What is in reality being practised, at least in Old Goa, is a criminal assault on the principles of conservation and preservation of these monuments.

During the 34 years of ASI's intervention in the heritage monuments in Old Goa, serious lapses were noticed leading to irreparable damages. For instance, the roof over the Chapel of Blessed Sacrament in the See Cathedral was substituted by a RCC slab! Due to the climatic conditions in Goa, this new roof started leaking to the point of damaging the rich Venetian paintings of the seventeenth century, exposed on the vault of the chapel. After heavy pressure from NGOs and others, the ASI realised their blunder and after 33 years reset the roof, though the work differs considerably from the original.

Other wanton acts on the part of the ASI have further damaged the monument, e.g. the white-washing of the walls of the Cathedral, which had beautiful paintings along with the attractive gold coated shield and crown in relief on the vault of the cross-aisle; the oil painting of the basalt stone pulpit; the raising of garden level to a height of one metre towards the Archepiscopal Palace, thus endangering the stability of the walls of the palace.

The destructive tendency of the ASI continues unabated even in the present days of heightened awareness of conservation processes. The systematic removal of the wonderful set of wooden railings that till recently adorned the interior of the Basilica of Bom Jesus, followed by the setting of the bronze statue of St. Catherine in the middle of the courtyard of St. Francis de Assisi; the erection of a bastion in front of the Church of Holy Spirit to serve as a cannon mount; and the opening of a large cistern very close to the historic chapel of St. Catherine for storage of water for the garden are clear examples of breaches of conservation principles of World Heritage Monuments. Also, the construction of a Circuit House under the guise of a chemical laboratory and a restaurant over the site of the ruins of the old Palace of Sabaio, later turned into the Inquisition Tribunal, and the construction of guest rooms within the convent of St. Francis de Assisi in RCC are but examples of processes for increasing the vulnerability of the heritage area to undesired development. The conflict between the aims of conservation and craving for modernisation is patent in the systematic removal of the age old stone pavement around the See Cathedral and its substitution by an apron of RCC!

Of late, the Archaeological Survey of India (Goa) has encircled with stones the garden hedge on the plea that pigs, dogs and goats are making their entry into the garden. The hedge carries wire mesh inside for preventing the intrusion of animals. It is surprising that, after 34 years, the ASI got up from their slumber and thought of encircling the area with a stone compound wall. The general principles for garden conservation are well established in international forums which lay down simple practices to minimize physical interventions and recreate appropriate spatial contexts by means of green hedges around a garden and not by raising stone walls.

Architectural conservation and archaeological preservation, though not mutually exclusive, differ in scope and intention. Therefore, an archaeologist unfamiliar with the discipline will never be able to work with the necessary vision and skill. In fact, the performance of ASI's office in Old Goa is a reflection of the amateurish work it is indulging in.

Fortunately, the desire for conservation of these monuments is taking a strong hold over Goan NGOs, intellectuals, architects and engineers,

who thought of organising a seminar in Old Goa with the participation of a large batch of superintendents of ASI offices all over the country, along with a group of seven foreign experts, from 11th to 14th December 1995. The areas of study in the seminar covered:

1. Architectural conservation with special reference to structural aspects and actions,
2. Causes of decay in materials and structures,
3. Internal environment of historical monuments (mural paintings, frescoes, graffiti, stucco, woodwork, gilt of retables, altars, pulpits, canopies, etc.), and,
4. Rehabilitation of historical monuments of Old Goa.

These participants inspected and identified areas of intervention and made several recommendations which have so far not been followed by the offices of ASI in Old Goa. Interestingly, during the seminar it was revealed that the ASI does not even have the influential Conservation Manual of Sir John Marshall (1923), which was stated to be out of print and not available in the office!

The conservation management of these important monuments is, unfortunately, in the hands of the Archaeological Survey of India, which is not duly equipped for the task at hand. In fact, the UNESCO recommendations are very particular that plans and documents should be drawn up, once all the necessary advance scientific studies have been carried out by multi-disciplinary teams composed of:

- i. specialists in conservation and restoration, including art historians,
- ii. architects and town planners,
- iii. sociologists and economists,
- iv. ecologists and landscape architects,
- v. specialists in public health and social welfare,
- vi. all specialists in disciplines involved in the protection and enhancement of historic areas, and,
- vii. the people concerned, whom the authorities should take the lead in sounding out the opinions and organising the participation of.

From the above, it clearly emerges that conservation is held to be an interdisciplinary activity involving a wide range of professionals, all of whom need to be formally trained to be given a common frame of reference. It is now high time the ASI revamps their present outdated working system and follows strictly the UNESCO recommendations for the World Heritage Monuments of Old Goa.

Percival Noronha

The destruction of village areas

Goa's green suburban villages are paying a heavy price for the real-estate boom and land speculation that this small state has witnessed in recent years, as a case study of the Bardez villages outlying Panjim show.

In less than half a decade, the village of Socorro has seen rampant destruction of forests, horticultural and agricultural land, according to residents of the locality. Local authorities—including the panchayat, comunidade, town and country planning and forest departments—have turned a Nelson's eye to the rampant changes going on.

Earlier, the Alto-Betim plateau and surrounding areas came in for speedy felling of its green cover, in an area that once stood out virtually like an oasis of green close to the state capital. But as this land got exhausted, realtors turned their eyes on the hill slopes further inwards, along the arterial Panjim-Mapusa stretch of the National Highway 17. Salvador do Mundo, which lies on the eastern side of the highway, and the village of Pilerne on the west have come under pressure.

Said Socorro panchayat member Soter D'Souza: 'Even before anyone has time to complain, the land is cleared of all growth. Felling of trees commences at about 4.30 pm, and by 7 pm, the wood is loaded onto trucks and transported.'

Apparently, some special persons undertake such contracts, and are known to have contacts with State Government officials whose job it is to protect the greenery.

Complaints to the officials at Panjim sometimes result in an investigation after a gap of four to five days. By this time, naturally, the evidence is well destroyed with fire. In some cases, standing trees have also been accidentally damaged by raging fires.

Bulldozers have scarred pockets along the hill-slopes of Ambirna, till recently a dark green village, where according to villagers one could even see an occasional peacock and other wildlife. Fields along the Guirim-Porvorim stretch of NH17—which grew paddy and groundnut crops—can also be seen as victims of destruction. Conversions of these fields are being gradually facilitated under various guises.

Since open spaces in the locality are not clearly demarcated and made public, developers and allegedly some local village politicians have been guilty of subdividing open spaces and selling plots.

Significantly, villagers who went to the Town and Country Planning Department found the concerned old site plans missing.

Villagers have also complained against the construction of an eight-metre wide road through forest and cashew plantations which also involves the cutting of hill slopes. This was done even while the government said it had no proposal for an industrial estate at Maina in Socorro.

Frederico Noronha

Mickey Mouse Architecture

Why Architecture? Milton spoke of Athens as being mother of the arts—a somewhat Eurocentric view—however, given the century and the fact that he was a poet, he might be excused. Banister-Fletcher went a step further and pronounced Architecture as the mother of the Arts—being an architect himself, he might also be excused. Friedrich von Schelling referred to ar-



Mickey Mouse architecture of Goa University at Dona Paula

chitecture as 'frozen music'. Being a philosopher, he too might be excused. I myself draw an analogy with language. In as much as that in Architecture there is grammar, syntax, paragraphs and narrative—I trust that in the fullness of time, I too shall be forgiven.

Why 'Housing'? It should be borne in mind that construction (including roads, bridges etc) occupies some 12% of Gross Capital Formation, and approximately 60% of that is devoted to housing. This is a huge slice of the national cake and cannot be ignored.

When we speak of Culture and Society (biggish concepts) we must involve History. Domestic buildings are made of perishable stuff, so prior to 1510 (the coming of the Portuguese), nothing remains of domestic architecture. Fortunately, public buildings are made of hardier material and among these, churches play a major role. The Portuguese secured the Catholic religion—spiritually as well as symbolically—not only through conversion of large numbers of people but also by planting churches on the very spot where temples had once stood. So that when we speak of a 'Vernacular Style', we are referring to a legacy left by the Portuguese.

However, when we speak of the 'development of a style', we are confronted with a number of disturbing approaches. I have selected three that continue to dominate the urban scene:

1. Mickey Mouse Architecture: No comment is necessary, since the images speak for themselves.

Sufficient to say that in an effort to seek novelty, designers have reached out and incorporated forms that have reference neither to history nor context.

2. Misunderstood Vernacular: This implies the use of a grammar for decoration, rather than as an outcome of necessity. The result is a mish-mash, making the syntax entirely meaningless and the consequent narrative patently absurd.

Examples of this kind of nonsense may be seen all over Goa.

3. Gulf Style: The great Goan diaspora has taken an ugly turn. A sinister version of the Cargo Cult appears to have taken hold, resulting in forms that are totally inappropriate to the Goan context. Grammar such as flat roofs and Islamic arches are not only inappropriate but an aesthetic eyesore. As for the narrative—it is nonexistent.

However, all is not lost. There are a few architects who are genuinely trying to find a direction, that not only develops the grammar but attempts to utilise the context—historical, climatic, social—in order to create an architecture that has relevance within the Goan context. Variety with meaning can be had and new directions sought, without recourse to Mickey Mouse Architecture or Misunderstood Vernacular, through a proper understanding of the past and its potential for the future.

Finally, I would like to make a plea. The man-made and natural environment are two sides of the same coin. We live in a lush climate on the West Coast of India. Most things will grow and the variety of plants is legion. Yet we seem to be extremely parsimonious when we come to design outdoor spaces. In addition to a cool season, we also have a hot one and a wet one. Why not take advantage of this and indulge a varied landscape—changing as the seasons change?

Cho Padamsee, December 2001

The Goan house and its setting

The Goan house and the Goan village in which it is set. Both are exquisitely designed and planned and are the result of much wisdom and aesthetic sense displayed by our forefathers. Much admired and remarked upon, the traditional architecture is nevertheless falling into disuse as newer (though not necessarily better) materials, styles, needs and greeds take over. Unfortunately, many old Goan houses have remained unoccupied for years (except when the family comes down from Mumbai or abroad for a holiday) and are slowly falling apart. But a sizeable number are still lovingly cared for by their owners, though this is becoming increasingly difficult with rising prices and the decline of many of the traditional crafts involved in house building. As for planning of our villages, this has been completely neglected and has often been the victim of petty politics and naked greed at the panchayat level.

Documenting the history and the current status of the Goan house was a labour of love for Gerard Da Cunha and his group. The book lovingly goes into the intricacies of the traditional Goan house, providing our admiration an informed base. Lavishly produced, with excellent colour photographs and illustrations, the book not only covers the well-known houses, but also shows how these and other humbler dwellings were based on the same influences. Along the way, it demolishes some popular myths like the one about traditional Goan architecture being an exclusively Christian preserve.

Excerpts from the Foreword by Gerard Da Cunha:

'The story of the Goan house begins in antiquity and like all vernacular architecture, it begins with the deployment of locally available materials within the framework of a local climate. Goa was generous to its house-builders. It offered bamboo, coconut palm, a variety of hardwoods, laterite blocks and boulders, soil ideal for rammed earth and shell lime from its estuarine waters. Its monsoon was fierce and protecting oneself from it was the basis of architectural form.

'The Portuguese conquest of Goa in 1510 changed the development of the Goan house inexorably. Just as the others before them had realised, the Portuguese too decided to use religion to make inroads into their new colony. They did this through large, impressive religious buildings. The buildings not only gave the rulers a feeling of permanence; they also became advertisements for the success of the Catholic faith ...

'What is it that makes Goan houses, both Hindu and Catholic, so special? For a start, it is their perfect placement in the landscape. Set history aside and it would seem that each village employed a sensitive urban designer (as the term rural designer does not exist in the architectural dictionary) who carefully placed the village green, the market and chose a strategic location for the village church. In this complex he functioned as sutradhar or theatre director carefully taking into

account the choreography of feasts and processions. Our deft designer then placed the houses in exclusive neighbourhoods and peppered the place with numerous Crosses, tulsi vrindavans and chapels.

'Walk down a village lane and you'll see that these houses are like elegant and dignified men and women chatting at a formal reception. The atmosphere is cordial and though the dress code is specified each individual is a nattily dressed, colourful personality with great individual confidence and swagger! And just as each party guest is unique and varied, the variety in the detail of the elements in these Goan houses is astonishing. What made Goans channelise all their energies in house building and construct every window, column, railing, gatepost, eavesboard and plaster differently? I suspect it began with a few individuals constructing something special sparking off an interest amongst neighbours and setting off a chain of events that engulfed the whole architectural scenario.

'The ingredients were perfect for this amazing pot pourri—borrowings from the West and roots from the East in the hands of a people in search of their own identity. The end product? A domestic architecture comparable to the best on Earth. Sadly, these houses were also a product of an agrarian feudal system. As this system began to show signs of strain towards the middle of the 19th century the wealth needed to sustain, refurbish and maintain these edifices diminished. Large scale migration followed a famine of economic opportunities at home and houses began to be

abandoned. Goa was liberated from Portuguese rule in 1961 and the decline of the Goan house became more pronounced as tenancy protection laws further reduced sources of income.

Who can tell what the fate of these beautiful houses will be? Will some of them be replaced by faceless blocks of flats constructed by property dwellers bereft of any imagination? Will some of them come under the hands of skilled and sensitive experts who will then convert them into vacation resorts?'

And some details on how traditional Goan house architecture was a product of the environment and how each feature had its rationale in the context of the surroundings:

'One of the most distinguishing features of the Goan house is that it appears to merge with the landscape. Picture vast fields of ripening paddy, tinted with glints of green and gold and right in the middle of this sea of green-gold, a house. All you can see of the house at first is the roof. It looms large and appears as if suspended in mid-air, sloping this way or that. It is only when you move in that you see the doors, the windows, the panels on the walls, the columns and the railings. It is only when you squeeze the brightness of the sun right out of your eyes that you see the mouldings, pilasters, pediments and other embellishments.

'The main factors that were taken into account while designing the Goan house were the high temperatures, high humidity, glare and solar radiation ... A combination of good ventilation in

Residence of Dr. Sidney Pinto do Rosario: The Western influence in interior decoration



the rooms reduced both temperature and humidity which made for comfortable living without the aid of punkahs or electric fans.

By planting their gardens with a profusion of flowering shrubbery and fruit trees, Goan builders controlled solar radiation to a degree adding to thermal comfort. The choice of building materials also contributed to the comfort of the house—laterite and *chuno* plaster. These materials have a low thermal capacity to absorb heat.

'Another factor that contributed to the comfort of houses was the high plinth. With the raising of the plinth, houses captured the breezes from the sea and also protected the house from rising damp during and after the monsoons.

'Elongated open plans and large rooms allowed for the easy passage of air. In large houses every room received cross ventilation as the inner wall of the house opened into courtyards giving homeowners a feeling of living in a perforated building. These perforations reflected the priority that the Goan house builder gave to a well-ventilated house.

'At the human level the Goan house allowed for ventilation through large, full-length, fully openable French doors. When most houses today have windows that open only up to the window sill, allowing air to flow over the upper half of the human body, houses of the past allowed for carved panels with ventilating holes as part of the carving or design to allow for greater comfort.

'The Goan house of the past used environmentally friendly building material. These wooden roofs, thick mud and laterite walls, cow dung and mud plaster for flooring and clay tiles held very little heat and cooled the whole house. Compare this with the choice of building material today—

concrete, aluminum and steel—that store heat and radiate it slowly into the house.

'Although the siting of village houses was within the parameters of village hierarchy, houses were randomly arranged. This caused the velocities of the passing wind to be considerably reduced while allowing for air circulation. On the other hand, row houses such as the ones we see in today's times create a barrier that effectively blocks the free passage of wind.

'Roofs in Goan houses were tiled with country tiles or Mangalore tiles. They were pitched, enclosing large volumes of air. Vent tiles provided extra ventilation and high ceilings allowed for better circulation.

'Tall trees like the coconut, mango and arecanut provided shade as well as allowed for the passage of wind and abundant oxygen. Besides, three to four layers of corbelled country tiles over a cornice below the roof projection gave 20th century Goan houses that much more protection from the rain.

'In the houses built around the 1900's, the balcao evolved into a veranda which ran around the house on three sides. French doors, which opened out into the veranda, got their protection from the lashings of the monsoon rains by these verandas.

'Houses with mother-of-pearl shells on windows had the added benefit of being able to cut out glare during the day. Later, as glass became more fashionable, coloured glass also found favour as it was found more adequate to cut off glare and bright lines from lines of vision.

'Even the most modest houses in 20th century Goa were constructed on high plinths. This protected walls from rising damp during the mon-

soons and enabled houses to catch sea breezes, which would otherwise be blocked off by vegetation at sea level.

'Earlier houses, with windows at sill level, were forced by Goa's climate to have temporary sunshades to protect the windows from the sun and the rain. As the Goan house evolved, the veranda was introduced (1890) and the French doors replaced windows ...'

Houses of Goa

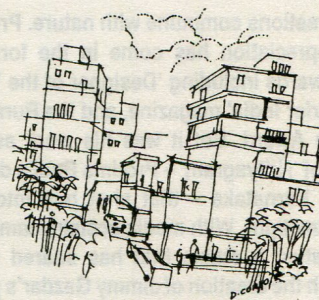
Foreword by Gerard Da Cunha

Text Heta Pandit & Annabel Mascarenhas

Photography Ashok Koshy

Architecture Autonomous, Goa, 1999.

Price: Rs 1450



A common Goan house, built with laterite brick, with balcao (balcony)



Gerard da Cunha

A product of the Delhi College of Architecture, Gerard worked for a year with the famed Laurie Baker in Kerala. The oneness with nature that Baker advocates is reflected in Gerard's views. He defines his natural architecture as following a natural process of creation. 'The buildings are individual and spontaneous, fit into the setting, have the right atmosphere, and never fail to capture the view.'

And this could not be truer than what he is most proud of: his own house in Porvorim. Set in sylvan surroundings, it's a creation that blends beautifully with the landscape.

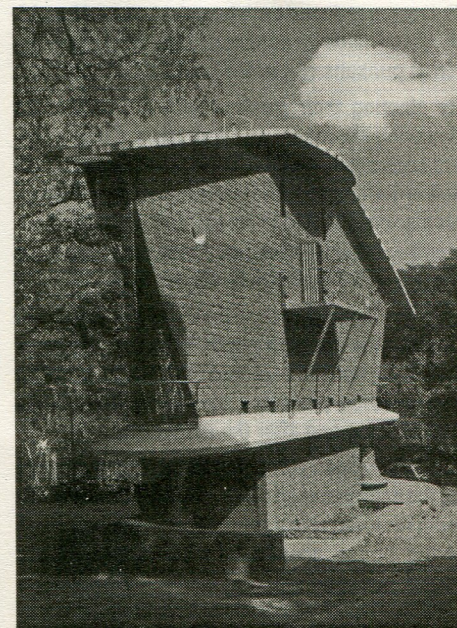
Gerard calls himself an academic architect. 'I am not as prolific as Laurie Baker. I don't like to build too much.'

But his creations commune with nature. Professional appreciation has come in the form of several awards including 'Designer of the Year' from 'Interior India' magazine, and the Rural Architecture Award. But it was his work as the architect of 'Nrityagram' – Protima Bedi's dance village in Karnataka – that shot him into the national limelight. With media acclaim came celebrity status: a status that has soared even higher with the creation of Jimmy Gazdar's palatial mansion at Sinquerim.

Ironically, Gerard started out as a low budget architect! But even now, with fame dogging his heels, it must be said to his credit that he has every intention of staying low cost, notwithstanding the Sinquerim project. 'I build the cheapest in the land', he says. He has worked with capital investment of as little as Rs 1 lakh, and in no way was aesthetics compromised.

He believes that one must build with nature, not against it, and so he relies on materials like mud and stone, creating buildings that blend with nature. 'These materials bring down costs and are also flexible to work with,' he points out. 'But I would like to add that I work with whatever is available locally. For instance, in Delhi, it is cheaper to work with bricks while in Bangalore, it would be stones.' Probably because he has been equated with natural materials like these, he hastens to remind you that he is open to all ideas and would 'jump' at the chance to build 'a high-tech' building in Japan. 'I hate being bracketed into any category.'

Gerard has also taken time off to complete his lavish, coffee-table contribution to Goan traditional architecture called *Houses of Goa*. The book, though expensive, has done very well.

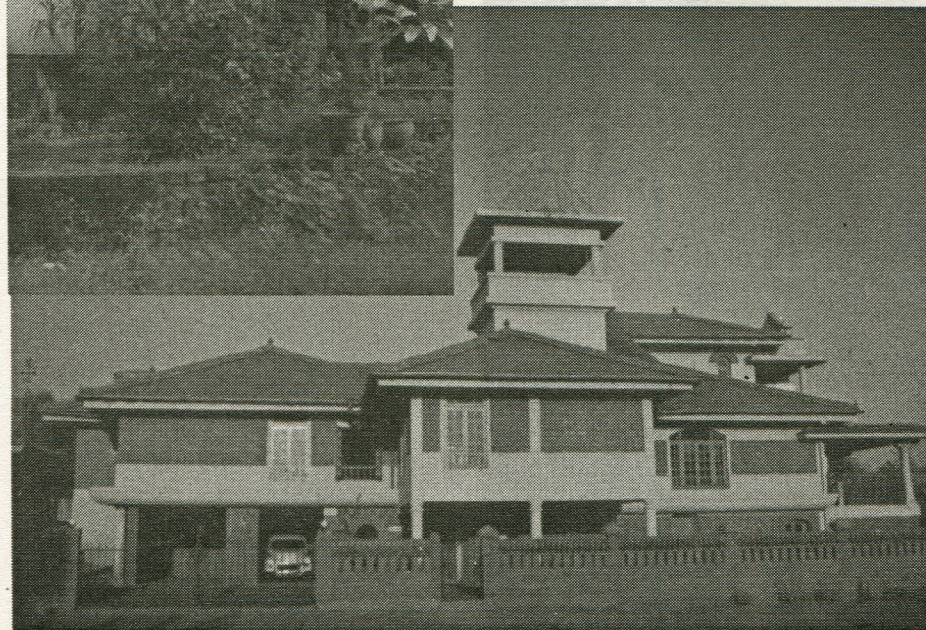


Museum designed and built by Gerard da Cunha



Known as an environmentalist and equally as an architect, Kamlakar D Sadhale is the founder of Nirmal Vishwa—the oldest environmental NGO (formed in 1983). Sadhale's professional practice has centered on holistic, sustainable architecture, evolving creative ideas of development and construction.

Houses designed by K D Sadhale



K D Sadhale

Sadhale pioneered cooperative housing in Goa. But he is also known for many unconventional experiments in construction techniques and house design, right from the use of precast technology and indigenous materials including mud. He designed and constructed the first contemporary-style mud bungalow in Goa. One of his housing projects with an eco-friendly design was awarded the National Award in the year 2000 by the Indian Institute of Architects.

Sadhale is also a reputed temple architect, with demonstrated skills in the use of traditional temple designs.

He has also played an effective public role in the conservation of Goa's natural and built heritage. He has sat on a number of official committees including the Eco-Control Committee and the Conservation Committee. He has also been a member of the Goa State Wildlife Advisory Board.

As an activist Sadhale was extremely vocal in the agitation against the Du Pont Nylon 6,6 project proposed in Ponda taluka. He played a leading role in the protest movement against the proposed factory and later wrote a book recording the day to day agitation which led to Du Pont's exit from Goa.

He is now pursuing and developing ideas of productive landscapes; concepts of integrating waste management in architectural design; and the conservation of Goa's pre-Portuguese heritage.

Sarto Almeida

Sarto Almeida, Goa's seniormost practising architect, has a body of work spanning across thirty eight years and which range from very small monuments to bungalows, schools and colleges, religious complexes and to commercial and industrial buildings. He has also been involved in the restoration of heritage buildings.

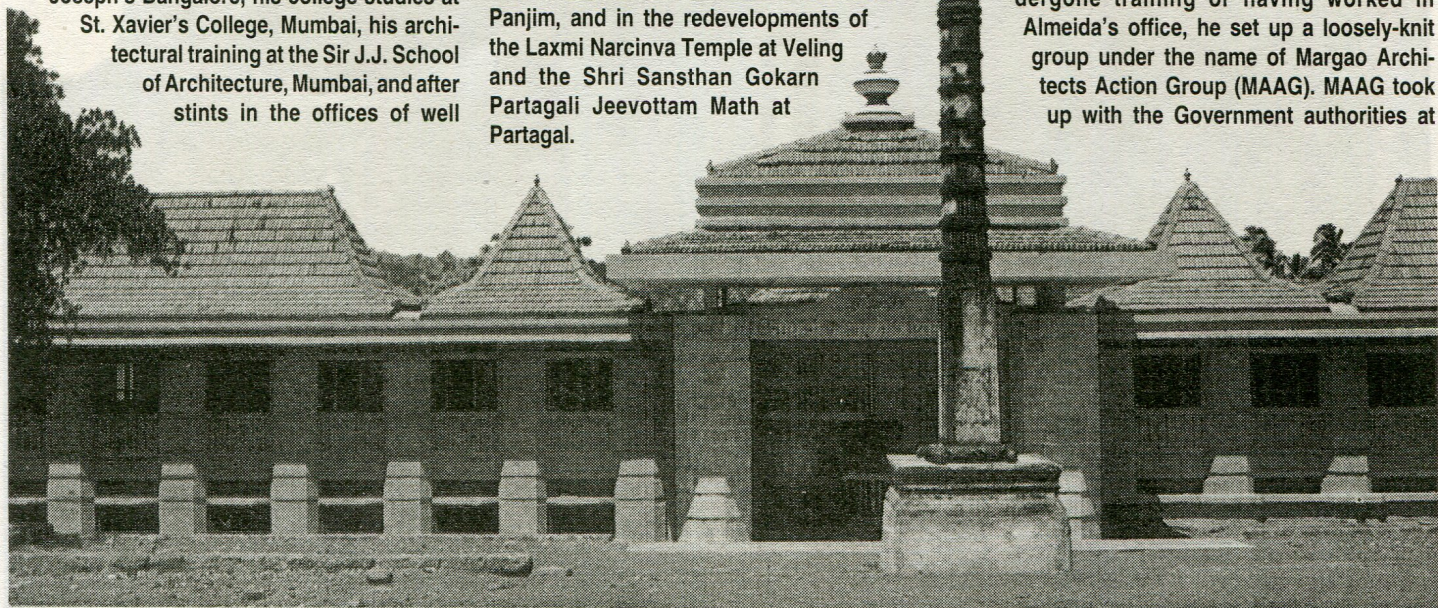
Almeida, though born in Goa, spent his early childhood in East Africa, did his schooling at St.

Joseph's Bangalore, his college studies at St. Xavier's College, Mumbai, his architectural training at the Sir J.J. School of Architecture, Mumbai, and after stints in the offices of well

building. But Almeida soon realised that though these buildings were very good in themselves and very photogenic for the magazines, they were out of place in the context of the Goan landscape and climate. His following works thus reflect a constant striving for contextual relevance through the modernist idiom and in reviewing the work of Almeida one is conscious of the concern for regionalist values. This is seen in the Handicrafts Centre at Panjim, and in the redevelopments of the Laxmi Narcinva Temple at Veling and the Shri Sansthan Gokarn Partagali Jeevottam Math at Partagal.

Alvares of the Goa Foundation, he helped in preparing factual reports of the relevant sections of the coastline whenever there were efforts by the government to delete or dilute the governing regulations in those sections in order to permit development, which would adversely effect not only the coastal environment but its ecology too.

Many of the architects in Margao having undergone training or having worked in Almeida's office, he set up a loosely-knit group under the name of Margao Architects Action Group (MAAG). MAAG took up with the Government authorities at



The redevelopment of the Shree Sansthan Gokarn Partagali Math is Almeida's most successful effort at delving into historic sources to recreate forms which transcend the immediate, and belong to the past the present and hopefully the future.

known architects J. A. Retchie and D.S. Bajpai in Mumbai, joined internationally famous architect B.V. Doshi at Ahmedabad. It was here in Ahmedabad that Almeida met his wife Therese, an educationist. On a short holiday to Goa in December 1963, Almeida rediscovered Goa and fell in love with its beautiful environment both natural and man-made. He decided to settle in Goa, a decision made possible by an invitation from a very close friend, architect Lucio da Costa, to join him in his practice in Goa. Almeida has been in Goa and practising here since June 1964, first in partnership with Lucio da Costa and then on his own from 1966 on the departure of Lucio da Costa from Goa to settle in England.

Architect B.V. Doshi was an important influence in Almeida's architectural development and it was fortunate for him that Doshi's office was rich in work experience handling large projects with complex programmes, some of which Almeida was put in charge of. Doshi was an assistant of Le Corbusier and was in charge of Corbusier's works in Ahmedabad and his personal works at that period were very much in the Corbusian mould. This influence is very visible in Almeida's early works in Goa, like the Minor Seminary at Pilar, the Chamber of Commerce and Industries building at Panjim and the Carmelite Church at Margao. These works had a strong sculptural quality wherein the form expressed the functions in the

Due to his active involvement with the Town and Country Planning Department in the physical planning of Margao and of Salcete in general, he was proposed by the then Chief Town Planner Dr. S. P. Deshpande to be the Chairman of the newly constituted Southern Planning and Development Authority for Goa (SPDA). As the then SPDA could not function the way it was intended, he resigned before the expiry of his two-year term.

Almeida is one of a very small band of architects in Goa who are striving hard to preserve Goa's heritage, both natural and man-made, and the quality of life enjoyed by its populace in the sixties. Sadly he notes that most architects are not conscious that Goa is rapidly losing this wonderful legacy at the hands of avaricious developers and ignorant planning authorities.

Almeida's concern for heritage conservation led him to be a member of the Government Conservation Committee from its inception till 1997 and he was chiefly instrumental in defining the norms for conservation through discussions and submissions of articles on conservation to the Committee.

He was a member till 1994 of the Government's Eco-control Committee constituted to regulate coastal development within 500m of the high tide line. His presence in the committee helped it tremendously to withstand pressures from the developers. In collaboration with Dr. Claude

various times issues pertaining to the proper development of Margao. Almeida designed and supervised the Children's Park at Gogol free of charge as MAAG'S contribution to the town.

His deep concern at the deterioration of values in society led him to join his wife to start Mano Vikas School whose aim is to inculcate values of integrity and honesty in children and to develop both the physical and mental abilities of the child so that it could stand on its own in future life and be a catalyst towards improving society.



Nilaya designed and built by Dean D' Cruz

It was with Nilaya, a carefully nurtured project, that Dean came into prominence. Nilaya is a graceful residence-resort nestling on the verdant Arpora hill top.

The charm of Nilaya lies in the walls of locally quarried rubble dressed and jointed to perfection; its rustic coconut rafter, country-tile roof; its golden glistening mud brick dome; its variedly hued cement floor with its striking patterns and motifs; its thematically different rooms; the delicately carved stone pillars. With its pool mirroring all this, the surrounding trees, and the blue of the sea nearby, it is a truly magical place!

Unlike most architects who rely on contractors, Dean has been involved in the actual building process from sourcing of materials to directing the masons, which is why the accolades have been fair reward. He has designed and built many resorts, houses and institutions since, but Nilaya remains a show case for his talent, both in delicately crafted materials and spaces. And if the trees could, they would testify how the building changed course to avoid having to cut them down!

The core feature of Dean's architecture has been the use of locally available natural materials, leaving them as original as possible to tell their own stories of texture and colour. Thus stone is carved and dressed, but not plastered (except for internal spaces where practicalities demand it).

Wood is polished, never painted over. Steel grills and gates are made free form and patterned on natural themes, unlike the 'prison bars' one normally sees.

Environmentally conscious, Dean meticulously surveys each plot of land for trees and natural features, so as to disturb the local landform and flora as little as possible when building starts. The unstated doctrine is that trees and natural landscape are value additions to the building to which the latter must respond.

Despite all this, Dean still remains in the forefront of architectural development. His uniqueness has been recognized by the awards he has won in recent years. In 1998, he won the Award for Design of one of the 100 best small hotels in the world for Nilaya. In 1999, Designer of the Year-Special Commendation for Pousada Tauma, a small boutique hotel that captures Goa's natural features thematically; in 2001, the Excellence in Interior Design Award in the Commercial Category for the Sangolda shop, an adaptive renovation and restoration of a heritage house, and again in 2001, the Hospitality Pinnacle Award for Hotel Architecture for Coconut Creeks, a resort that responds to Goa's climate and natural surroundings.

For some time, he was a member of the Conservation Committee, but was dropped after the government found he was unwilling to

compromise to favour developers. A social activist at heart, Dean volunteers his services to Goa's planning activities. He is also actively associated with NGOs working for Goa's development and environment and looks forward to projects that are beneficial to society. He has participated actively in protests against illegal roadside development, eyesore billboards and the illegal waste dump on the Saligao plateau.

Tailpiece: Sossegado

Come the afternoon and Goa closes down. Wherever one goes in Goa between 2 pm and 4 pm, one is greeted by silence, except for an occasional snore emanating from the windows of some house. If you visit a government office, chances are the officer is taking his 40 winks.

And why ever not? Birds and animals do it. People in traditional cultures all over the world, particularly in hotter climes, do it. And Goans do it with a vengeance. Visitors can be taken unawares. Unless they stick to the tourist belt, where a more demanding and dehumanising money-chasing culture has taken hold, they are going to be confused by the lack of activity. If they actually barge into a store and ask to be served, they may be greeted with nasty looks and slow, grudging service.

for the *siesta*. The drowsiness you feel after lunch comes not only from the food but from the time of the day.

The food does contribute, of course.

Our Goan staple of fish, curry and rice is not conducive to strenuous activity and alertful minds immediately after consumption.

The parboiled rice we are fond of sits



It is commonly believed that the afternoon *siesta* is an import of Portuguese origin, but this is doubtful. All over rural India, the afternoons are devoted to slumber. This makes complete sense given the heat. The Indian farmer rises early, sometimes at 4.30 am and the hours from sunrise till noon are spent in backbreaking labour in the fields. After lunch, a nap is essential to rejuvenate and restore the body's energy. And then from 4 pm to sunset, one can return to work refreshed and give of one's best. The Latin *siesta* of the Portuguese thus found fertile soil in Goa and was probably one of the few areas of complete agreement between the colonial rulers and the subject population.

This custom, apart from saving you from the tortures of the afternoon sun, has found scientific support from recent studies. Taking a short break in the middle of the day is not only healthier; it is also more natural. Sleep researchers have found that the *siesta* and its biorhythm are more closely tuned to our biological clocks. Humans are 'biphasic' creatures, requiring days broken up by two periods of sleep instead of one 'monophasic' shift. So there is a biological basis

heavy on our bellies and a somnolence overcomes us, which we gratefully surrender to, given the slightest opportunity or excuse.

Others may look askance: productivity, after all, has become the world's largest religion in the recent past. Our ancestors, however, had greater sense and placed as much emphasis on social and family life as on work, and left sufficient time and space for everything in their lives. Contrast this with the harried city-dweller who leaves home at 8 am and returns at 10 pm, completely dead-beat and hammered by stress. Even during his holidays, frantic and pointless activity seems to be the *raison d'être* of his existence, if the evidence we see from the behaviour of the tourists who come to Goa is any guide. His family suffers, his social life suffers and he is a washed-out, ulcerous wreck by the age of 40. And look at our 'sossegado' Goan. He works as much as he needs to, spends plenty of time with family and friends and keeps in touch with himself and nature. Which life-style makes more sense?

Goans are often derided and abused for being 'sossegado'. Sossegado means being relaxed, happy-go-lucky, easygoing. It is an indictment of

modern civilisation, in fact, that it finds such an attitude to life bad almost by definition. Maybe we need to ask ourselves some hard questions about the purpose and meaning of life. Is life only meant for the ceaseless consumption of goods? Why are we humans in a rat-race, when all the time we celebrate how superior we are to the other animal species? Why do we compare ourselves needlessly with the machine when it comes to calculating productivity? Isn't the machine, really speaking, a lifeless thing which never had a soul and which can never dream of having a personality?

The *sossegado* approach serves to protect Goans from getting too involved in the development process and from letting it ruin their lives. Lack of aggression, satisfaction with one's lot, can be mighty protective influences, preventing oneself from being brainwashed by the chimera of development. As a friend of ours said: 'Maybe the nightmares they are wishing upon us have some good features after all, but the whole business involves too much damn effort!'



If one goes by historical research, the environmental health conditions during Portuguese colonial rule seem to have been quite atrocious. In comparison, the position today seems to be much improved.

The most serious aspect of environmental hygiene seems to be related to the problem of disposal of sewage and industrial waste by cities, industries and beach resorts into the rivers and the sea. Modern life is also generating enormous quantities of garbage which Goans cities and towns are no longer able to cope with, since the bulk of it is non-biodegradable.



Hell-hole: Mapusa's former (illegal) dumpsite

Public Health

The Government has brought in many new pieces of legislation including the Goa Non-Biodegradable Garbage (Control) Act and the Anti-Smoking and Anti-Spitting Act. But in the absence of proper implementation, these Acts remain on paper. Fed up with the state of affairs, many citizens' groups have taken the initiative to tackle the problem on their own.

Meanwhile, epidemic diseases have once again reared their ugly heads. Malaria has emerged as a major killer in the past few years. And so has HIV/AIDS. In some areas of Goa, groundwater contamination from sewage is now an acknowledged fact. Noise, litter, garbage are taking their toll on the environment and violating our idea of beauty forever, as they crowd the landscape with their presence.

PUBLIC HEALTH

A comprehensive source on the conditions and problems of health and hygiene (both personal and public) during the entire 500 years period of Portuguese colonial rule in Goa is now available in the doctoral thesis of Maria Fatima L.T. da Silva Gracias titled *Health and Hygiene in Goa (1510-1961)*. The manuscript has been published by Concept Publishers, New Delhi and is available at the Other India Bookstore.

The book locates the discussion on public health by examining first the different standards of living of the various strata of society in Goa during the Portuguese regime, and then investigating how these living standards eventually affected the health condition of the populace. It provides a detailed inventory of major health problems during the period and the reasons why there were frequent epidemics.

Dr. da Silva Gracias makes the categorical statement that Goa during the Portuguese regime 'was an unhealthy place due to lack of sanitation caused by scarcity of protected water, drainage system, proper toilets as well as means to dispose of garbage and night soil. Hygiene was generally given a low priority. Lack of sanitation was a major cause of different diseases. Though much attention was paid to personal cleanliness ... the inhabitants neglected their surroundings and general environments.'

She also establishes that the Portuguese Government did fairly little to remedy the state of affairs till it was eventually forced to do so in the decades before Liberation.

She records that these unsanitary conditions led to diseases and pestilence. Typhoid, gastroenteritis, skin diseases, malaria, encephalitis and intestinal infections took a heavy toll of life.

The greatest problem, writes Dr. da Silva Gracias, related to the disposal of human waste.

'It was a common practice to defecate in fields, river banks, bushes, hills and streets near human habitations. Even courtyards were used for such purposes. As a result, many of the parasites that thrive in human waste were washed into rivers, streams, wells and tanks.'

Dr. Fryer, an English traveller, who visited Goa in the 17th century, refers 'to a curious habit of throwing excreta on the rooftops for the birds to do the cleaning.'

The houses had no proper toilets and the upper class people used pots which were emptied into the rivers by a class of scavengers (*bhangis*) brought in from British India. This practice still continues in a few areas in Panjim today.

'Efforts to improve the disposal of nightsoil were not successful despite a *postura* (municipal order) which directed that all excreta was to be emptied only between 5 am and early evening in the sea, i.e. during low tide. Otherwise the high tide deposited everything back on the shore.' But many times the *bhangis* simply emptied their pots in the streets and rain water drains.

Houses in Panjim also had fixed dry toilets maintained by the pigs. In 1863 individuals from Panjim made suggestions to improve the sanitary conditions in the city. Very often people tended to keep the nightsoil in the house the whole day as they had no one to carry it to the river, and Panjim citizens therefore suggested that one hundred blacks be brought from Angola to do the job. Lack of finances killed the proposal.

The Medical Board later suggested that all excreta should be disinfected. Separate pots for solid and liquid excreta were to be distributed among the poor, and nightsoil carriers employed to remove the excreta within 24 hours. However, nothing was done and epidemics continued to take a heavy toll of life.

In 1917 the Municipality of Ilhas decided to engage the services of Jal Jahangir Chichgar from Mumbai (but residing in Panjim) to remove the excreta and urine from the city and a contract was signed. The excreta would be collected twice a day in metallic jars. The expenses were to be met from the taxes collected for the purpose by the municipality. The contractor was responsible for cleaning the jars at his own cost and he also had to maintain the public toilets as well as the ones in government offices, hostels and boarding schools. The collection was to be carried out in carts between 5-8 in the morning and 8-11.30 in the evening. The arrival of the cart would be announced by the hooting of a horn.

Apart from human excreta disposal, the citizens of the city of Goa and later of Panjim had no facilities for the disposal of garbage, which they simply dumped on the streets, open fields or rivers, making the whole area a dangerous place to live. Refuse from the house would be thrown onto the streets. In the early 17th century the Viceroy was forced to issue an order forbidding the people from throwing filth on the streets. This also became the practice in Panjim after the capital was shifted there.

Many small lanes, notes Dr. da Silva, 'were inaccessible in the morning on account of the excrement found there.' The lack of a proper drainage created its own set of problems. Water accumulated round the houses and lanes. Even in the third decade of the century, drains along the streets were permanently clogged. Since the drains from the streets were connected with the river at high tide, the filth returned with the water to the drains.

Town Planning commences — It was principally to improve the sanitation of the towns that municipalities began to issue sets of orders by which the cleaning of houses, shops, cowsheds, wells and springs was made compulsory.

It is the Municipality of Sanquelim which was the first to issue guidelines to the working class who wished to build houses. All houses of this class had to face north-east. Every house was required to have a verandah in front and two rooms. The house had to have two side windows and three doors and palm leaves of all huts had to be changed every year in May before the monsoons.

In 1908, the Municipality of Canacona issued a detailed order covering all aspects of environmental hygiene. It had 136 clauses, one of which banned people from defecating in public places.

Generally, however, writes Dr. da Silva, 'the government appeared to be indifferent to the possible dangers facing the environment' until recurrent epidemics broke out in the early 20th century. It was these epidemics of cholera, plague and smallpox which forced the local government to issue the regulation of March 14, 1913 concerning environmental hygiene. The regulation required that 'all unused water sources be covered and vessels be emptied every two days to prevent breeding of mosquitoes' and prohibited the building or repair of houses without the approval of the municipality.

One other aspect Dr. da Silva deals with is the growth of population in Goa. The density of population has a corresponding impact on health and hygiene. According to Dr. da Silva Gracias, the city of Goa was overpopulated in the 16th and 17th centuries and this overcrowding created enormous problems. The inhabitants suffered from all kinds of diseases including cholera and the plague, some of the latter appearing in epidemic form.

In 1848, Salcete taluka had a density of 358 persons per sq km followed by Ilhas, Pernem, Ponda and Bardez. The census of 1931 showed the density of population in Goa as 133 persons per sq km. Salcete, Bardez, Mormugao and Ponda had densities above the average.

The density of Bardez began to decline after 1931, one of the causes being emigration.

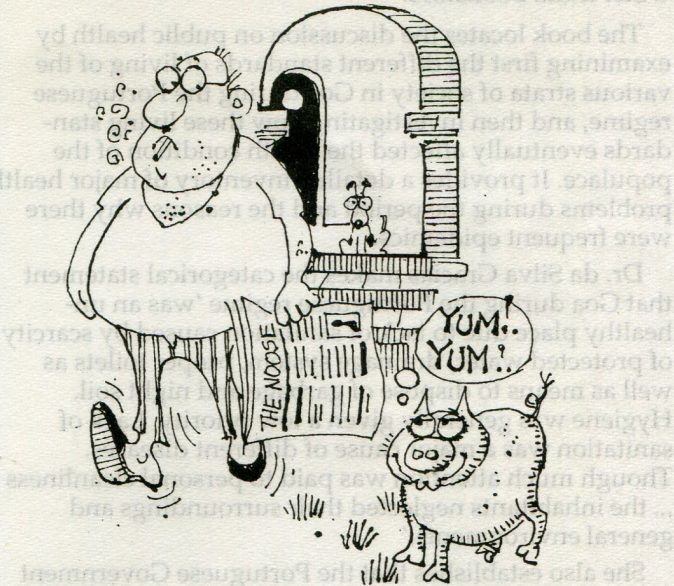
During the years 1940, 1950, and 1960, the density of population of Ilhas was 423, 440 and 478; in Salcete it was 417, 428 and 426; whereas Bardez registered 402, 391 and 369.

SEWAGE

After the departure of the Portuguese, the administration began a campaign against pig loos. It began to be standard practice among municipal health inspectors to dissuade people from continuing with such loos. The conventional advice was to replace such loos with septic tanks.

As a proposed solution, septic tanks were nothing to write home about. First of all, they readily stimulated the growth of mosquitoes. Secondly, they had to be desludged from time to time. Often, they were constructed badly, so they leaked and contaminated underground fresh water aquifers. Finally, they generated an unwelcome stink. Often, the soak pits could not take the load of the effluent from the tanks, and this too began to contaminate the open and underground environment.

The most startling aspect of this technological fix was that no one really looked carefully into the installation of these devices. The Planning and Development Authorities approved development plans but said they did not have to approve septic tank design and construction! The Municipal Councils granted licenses on the basis of an NOC provided by the Public Health Inspector or doctor from the Primary Health Centre (PHC). These persons



Sewerage & Sewage Treatment Systems for Panjim Town (as on 1997)

Municipal Area	Design Population (2021 AD)	Design Flow (MLD)	Scheme Adopted (STP)	Scheme Adopted Sewerage
Panjim (Original Municipal Area)	61,200	18.25 MLD (Total)	Additional 15.50 MLD STP (Extended Aeration Process and Tertiary Treatment, New STP for 17.25 MLD (Extended Aeration and Tertiary Treatment)	Strengthening and Extension of Existing Network
Taleigao & Durgavaddo & Dona Paula	72,100	17.25 MLD		New Sewerage Network (13.32 km)
Ribandar (and Part Chimbel)	6,000	2.54 MLD	2.50 MLD (Extended Aeration and Tertiary Treatment)	New Sewerage Network (6.60 km)

The CRZ Notification and Sewage

According to Section 2 (v) of the CRZ Notification, the discharge of untreated wastes and effluents from industries, cities or towns and other human settlements into the open sea or CRZ areas is explicitly prohibited. The notification requires local authorities to phase out existing practices of discharging raw sewage within a period of three years from the date of the Notification (19.2.1991)

None of the Municipal Councils in Goa appears to be aware of the prohibition. In Panjim city, there is only one sewage treatment plant (STP) which

meets only part of the city requirements. The STP at Tonca was designed for a population of 30,000 people. Today, the population has more than doubled, but there has been no corresponding increase in the sewage treatment infrastructure. The North Goa Planning and Development Authority is to prepare a Development Plan that takes into consideration sewage capacities of the city. However, the PDA has continued to allow increases in FAR despite the fact that the sewage system is already overloaded.

The Panjim STP does not work most of the time.

During the year 2000, in fact, when the plant was not working, untreated sewage was discharged directly into the sea.

None of the other cities including Mapusa, Margao or Vasco have a sewage collection or treatment facility. The Margao underground sewage pipeline is still to be fully completed and commissioned. People are refusing to connect their sewage to the line where it has been completed.

Mapusa does not have any facility whatsoever and continues to violate CRZ Rules. So does Vasco and Mormugao.

The Mapusa Municipal Council and many of the coastal villages like Calangute have agreements with the Panjim Municipal Council for treatment of the sewage pumped out of existing septic tanks at the Tonca STP. However, the MMC's tankers would rarely take the pumped out sewage to the Panjim plant but unloaded it instead at the municipal waste dumpsite outside the Goa Housing Board Colony.

Thus it may be concluded that the four Municipal Councils which are adjacent to CRZ areas are blatantly violating the provisions of the CRZ Notification despite clear directions of the Supreme Court of India.

At stake is the health of all those people, particularly tourists, who bathe in the water. Who is going to take this bull by the horns?

Sewage from Panjim: Sewage treatment plant discharged into Mandovi river



were not construction engineers. They merely measured the distance of the septic tank from any water bodies nearby and then granted the NOC. Which medical doctor would know about whether a particular septic tank could be adequate to take on the sewage load of a building?

Disaster was therefore bound to strike. It did, with a vengeance, contaminating groundwater supplies in several areas. In 1998 newspapers reported overflowing of soakpits of buildings in Santa Cruz village and resultant damage to drinking water wells. The High Court took *suo moto* notice of the pollution problem. During proceedings, the Court wanted to know whether there was any policy in force of the government to prevent such kinds of pollution.

Eventually, the Pollution Control Board presented the Court with the policy framed by the Central Government which is contained in the manual on 'Sewerage and Sewage Treatment' published by the Central Public Health and Environment Organisation. On 8th March 2000, the Pollution Control Board laid down the policy and issued directions under the relevant provisions of the Water Act, 1974. The Order was notified in the Goa Gazette on 10th March (Series I, Page 699).

The salient features of the directions are:

1. No soakpit will be permitted within 20 metres distance from any source of drinking water and vice versa.
2. Panchayat secretaries and chief officers will impose conditions when approving the construction of septic tank and soakpit within their specific areas. (The conditions are also part of the same Gazette.)

3. The statutory authorities were directed to see that labour and equipment were required for the purpose of de-sludging septic tanks.

4. Planning and Development authorities would earmark locations for sewerage treatment plants, demarcate the underground sewerage network in their Outline Development Plans.

5. The PDAs would also not allow any further increase of F A R while granting permission under Section 44 of the Act as it would result into increase in population density and thus cause additional load on the already overloaded system.

The directions also required that the final effluent should satisfy the standards notified under the EPA, 1986. The Board delegated powers to Panchayat secretaries, chief officers and PDAs to register complaints before the Judicial Magistrate, First Class, where citizens fail to comply with the directions. The Board held that it is the duty of the Municipal Councils and the Panchayats to take steps to prevent pollution from septic tanks and latrines. It said that lack of funds would not exonerate the local authorities from their statutory obligations and that they should make the necessary budgetary provisions for carrying out the directions.

The 2-year period laid down by the Board for complying with the directions expired on the 10th of March 2002. As can be expected, not one of the Municipal Councils or the PDAs, or the Panchayats of Tiswadi, Bardez or Mormugao to which the directions apply have bothered to read these directions and observe them, much less take steps to give effect to them.

THANK GOD FOR SULABH!

It is one thing to bemoan the appalling standards of public hygiene and sanitation in Goa; it is entirely another to do something about it at the community level. One of the factors that has made a big difference to standards of public sanitation in Goa has been the work done by a national NGO, Sulabh International. It began its work in Goa in 1985, under a Government of India scheme. The scheme envisaged sanitation facilities to 200 towns in India, two of which were Sanguem and Valpoi. The Government of Goa continued this scheme in collaboration with Sulabh, with the overall long-term objective of providing 77,000 latrines to cover the entire rural population of Goa. By mid-2001, 46,000 individual family latrine units had been constructed. The twin leach-pit system latrines are all of the approved Sulabh design, which has proven to be cost-effective as well as environmentally friendly.

The construction of these latrines has made a notable difference to the situation in Goa's villages; no longer is one treated to the unsightly vistas of human excreta scattered around on open plots. Studies have shown that the Sulabh family latrines have found good acceptance in Goa, and that they are well utilised. There continues to be sizeable demand for new units to be constructed, probably due to the fact that all BPL (Below Poverty Line) families get a 100% subsidy for the construction of these units under one or the other government scheme.

Sulabh earned its spurs in the state of Bihar, from where its founder Dr. Bindeshwar Pathak hails. Whatever one may say about the horrendous civic conditions in Bihar, one redeeming feature is that every sizeable town in the state has a public Sulabh Shouchalaya complex. The difference this makes is there for all to see.

The lessons of Bihar have been applied elsewhere in the country as well. Sulabh International recognises that if public sanitation is to be improved, it is not sufficient to construct individual family units; all towns must have public toilet facilities. When travelling, each of us has faced the agony of not having any public toilet facilities available; willy-nilly one ends up making a public nuisance, or suffering in silence. There is little point in having laws prohibiting urination and defecation in public places if there are no facilities available. This problem is now a thing of the past in Goa, as the table below shows.

The Sulabh public complexes have also gone a long way towards dispelling the notion that a public toilet is of necessity filthy. Complexes maintained by Sulabh are by and large clean and well-built. The person in charge of the toilet is provided a room with a cooking platform and lives within the complex itself, contributing to its maintenance. A nominal fee is charged for the use of the toilet and bath facilities, while the urinals are usually free.

Sulabh International operates and maintains the complexes for a period of 30 years after construction, covering the entire operational life of the complex, thus avoiding any burden to the local authority in collaboration with which the complex has been constructed.

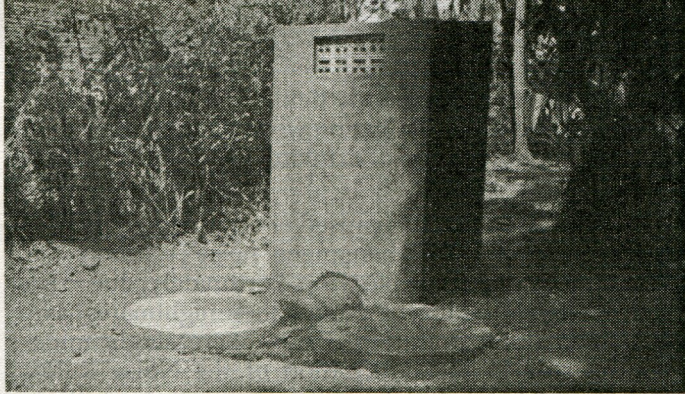
Sulabh International Social Service Organisation — Goa State Branch, Porvorim

Details of Single Seater Pour Flush Water Seal Latrines Constructed from 1.4.1985-31.3.2001 in Goa

District - North Goa		District - South Goa	
Place	Total	Place	Total
Poriem	1578	Navelim	1770
Valpoi	1753	Velim	1008
Mandrem	680	Margao	210
Pernem	1197	Fatorda	407
Dhargal	780	Loutolim	1145
Mayem	776	Benaulim	405
Bicholim	625	Cuncolim	950
Pali	939	Cortalim	939
Calangute	1025	Vasco	105
Siolim	750	Mormugao	240
Saligao	725	Curtorim	1420
Tivim	1130	Curcholem	1285
Aldona	537	Sanvordem	1957
Mapusa	240	Sanguem	1947
Panjim	2	Quepem	1865
St. Andre	1199	Canacona	1695
Cumbarjua	1515	Poinguinim	800
Taleigao	851		
St. Cruz	992	TOTAL	44094
Shiroda	2440		
Ponda	1808		
Madkai	2402		
Priol	2002		

Details of Public Toilet Complexes Constructed & Maintained by SISO Goa

Place	Total
Margao	14
Quepem	1
Colva	1
Benaulim	1
Curcholem	2
Sanguem	1
Verna	2
Canacona	1
Panjim	21
Bambolim	1
Mapusa	6
Vasco	17
Ponda	3
Molem	1
Kundaim	1
Old Goa	1
Baga	1
Calangute	2
Vagator	1
Anjuna	1
Bicholim	1
Assonora	1
Valpoi	1
Mayem	1
Pernem	1
TOTAL	84



Pour-flush toilet for individual residences in rural areas



Sulabh Shauchalaya (public convenience) at Mapusa

There have been certain problems with some of the complexes, with complaints from local residents. Recently, a complex at Margao was pilloried for not having adequate drainage facilities. This created a foul stink in the entire locality; standing water contributed to the breeding of mosquitoes.

In Ponda, Sulabh committed the inexcusable crime of discharging all the sewage waste from the Ponda unit into the *nallah*. When police complaints were filed by Nirmal Vishwa against such atrocious behaviour, the Sulabh staff visited the scene and 'cleared up' the *nallah* by pushing the sewage into the flowing water so that all evidence was taken down stream!

At Mapusa bus-stand, the waste from the urinals flows into a channel outside the Sulabh complex. The complex was constructed to discourage people from urinating along the existing channel!

The instances narrated above only serve to tarnish the organisation's otherwise excellent image. All the more reason why Sulabh should be more careful in future.

Sulabh International provides assistance to all who wish to construct an individual latrine at their residence. When possible, Sulabh undertakes the task of construction; otherwise, they will put you in touch with a trained mason and provide you with all the necessary plans. The cost of an individual family Sulabh unit is currently around Rs 10,000. As mentioned earlier, there is a subsidy of 100% for BPL families.

Sulabh International Social Service Organisation can be contacted in Goa at 860/1, Pundalik Nagar, Porvorim, Telephone Nos. 412219 & 414364.

PLASTICS, GARBAGE, LITTER & NOISE POLLUTION

There are some serious environmental issues that have emerged in the past twenty years or so; it is not that they did not exist earlier, but they have now assumed epidemic proportions, largely due to the expansion of the consumer culture. These are bothering citizens no end, since they signal a marked decline in the quality of life hitherto enjoyed in the state. They relate to the disposal of plastic, garbage, litter and sewage and the new phenomenon of noise pollution. Interestingly, these problem areas are calling forth positive citizens' initiatives that augur well for the future.

Plastic began its undesirable invasion of the Goan countryside and cities twenty years ago. Today, the omnipresent, garishly coloured carry-bags dumped cheaply on Goan traders and shopkeepers by a large number of plastic manufacturers are to be found everywhere. Every fair or festival leaves behind a veritable sea of plastic litter when the stalls are taken down. Dead cows have been found with their stomachs clogged with plastic. Marine turtles and certain fish species are also similarly affected. The plastic is now clogging streams and *nallahs*. It creates visual pollution. And there seems no end to the invasion. In addition, the expansion of tourism has led to unimaginably large quantities of plastic water bottles being strewn all over the beaches and coastal villages, rendering the beaches an even more unpleasant place to visit.

Alarmed at what was happening, the Goa Government brought forth the Non-Biodegradable Garbage (Control) Act, 1996 and ruled that the Act would come into force from 1st January 1998. Predictably, no action has been forthcoming after that and even larger quantities of plastics are now finding their way not only into the coastal villages but into the interior villages as well. The Ministry of Environment brought out a very weak notification in 2000 that prohibited the use of (recycled) coloured plastic bags below 20 microns in thickness from being used for carrying food. This has led to the disappearance of coloured (including black) bags. But it has led to a surfeit of white plastic bags promoted in a big way as 'environmentally friendly' and 'government approved'!

Getting desperate to deal with the problem, the Goa Government first increased the permissible thickness of plastic bags in Goa to 100 microns. Due to pressure from the plastics lobby, the ban on bags less than 100 microns was not implemented. After several meetings, the Government finally agreed to implement a ban on polybags that are less than 40 microns. In the meanwhile, decisions have been taken to ban plastic entirely in the three wildlife sanctuaries of Molem, Bondla and Cotigao. Miramar Beach and Old Goa have also been declared plastic free from July 1, 2002.

Citizen action against the misrule of plastic is however gaining ground. Environment groups in Ponda, Panjim and Mapusa, and even foreigners and tourists residing in villages like Anjuna, have carried out programmes for collection of plastic litter or for replacing plastic bags with paper ones.

Goans are beginning to discover also that they are extremely tolerant of overflowing garbage bins, litter, cesspools, and blocked drains. None of the coastal panchayats has bothered to equip itself to deal with the problems of garbage generated by tourism. The garbage of Candolim-Calangute is dumped unceremoniously in Saligao! The result is that large areas of coastal Goa are looking extremely dirty and forbidding.

By far the most serious problem is contamination of groundwater by overflow from septic tanks. Calangute water supplies are already contaminated, as studies from Goa University show. In Margao, former Deputy Collector and Sub-Divisional magistrate, Rajesh Prasad, issued *suo moto* orders to restrain buildings from discharging

untreated sewage into paddy fields. The Bombay High Court ordered an investigation when a newspaper reported contamination of drinking water wells in Santa Cruz.

Another issue that has caused enormous anxiety to the local population is the phenomenal noise pollution generated by nighttime partying. Fortunately, due to sustained pressure from citizens' groups, these nightmares have receded and noise pollution is now increasingly under control due to the notification of the Noise Rules, 2000. By and large, the phenomenon of increased citizen action is proof that people have lost faith in the administration and its laws and are ready to take matters in hand, leaving the government and the authorities including municipalities and panchayats, far behind.

Plastic-Free Goa Campaign

Many environment NGOs and citizens have been deeply agitated over the indiscriminate proliferation of plastic litter in the urban and village environments of Goa, and the abysmally hopeless and inadequate arrangements of municipalities and panchayat authorities for its collection and disposal. Swamped by an ever-rising tide of plastic waste, the Goa Environment Federation

(GEF)—a loose coalition of citizens' groups—took the lead in trying to find a solution. It decided to launch a campaign to physically and literally clean up Goa of plastic waste.

The PFG campaign was formally inaugurated on 2nd October, 2000, Gandhi Jayanti, and continued for eighty days thereafter. The growing public concern over plastic waste and its disposal was

amply demonstrated by the way people rolled up their sleeves, took to the streets, and got round to collecting the plastic waste in their neighbourhood. The sight of their fellow-citizens, toiling away in the hot sun, wading through muck and dirt, collecting waste plastic litter, enthused many bystanders to participate actively. The well-organised campaign had an all-Goa impact and even remote villages participated. Plastic collection days were fixed in all localities and systematic collection drives were organised. Goan NRIs sent contributions to the campaign once it was broadcast over the Net.

Tonnes of plastic waste were collected and transported to two plastic waste dumps, one in Cuncolim, the other in Mapusa.

What happened to the waste that was actually collected? Efforts were made to contact plastic reprocessors, but nothing really materialised. The reprocessors wanted the waste to be segregated, so that they could take only those bits which had some reprocessing value. Some even wanted the waste to be cleaned before they picked it up. No reprocessing solution could be worked out, so the plastic waste lay in the two central dumps, rather than flying about in scattered fashion in Goa's villages. Not much of an achievement, it would appear. But even this is not without its benefit, because the failure of options to reprocess the waste has focused attention on the basic reality of plastic—there are no meaningful reprocessing solutions, and the only way to tackle the problem is to stop, or at least reduce to the very minimum, the production and consumption of plastic.

Even though the campaign ended on December 20, 2000, individual plastic collector programmes initiated by various schools and other social service organisations have continued. These are routinely reported by the media and serve to keep up the pressure on both the government and the plastics industry. In the meanwhile, banks based in Goa have decided not to grant any further loans for the setting up of plastics units in the State.



Plastic collection during the Plastic Free Goa Campaign



SOLID WASTE DISPOSAL — MUNICIPAL COUNCILS

Panjim — The Panjim Municipal Council (PMC) started its Solid Waste and Resource Management (SWARM) project in 1995. The project, which is still operating, has three essential components: the collection, transportation and disposal of wastes, with emphasis on conversion of the waste into a resource. Garbage is collected daily from SWARM bins and through door-to-door collection from restaurants and hospitals so that the bins did not receive biomedical waste. The PMC arranged for two bins, one for biodegradable and the other for non-biodegradable waste, to be located at various places in the city. Except in one colony at Dona Paula, no segregation is done following the original scheme. The SWARM bins are used as collection points for mixed garbage which is then dumped at Curca.

PMC collects between 20 to 30 tonnes of garbage per day. Of this, it claims 30% is processed by vermicomposting. The market and restaurant waste, collection of which is given on contract basis, goes for vermicomposting directly as it is segregated prior to collection. City waste comes mixed, hence it is simply dumped in the quarry.

Medical waste is collected through a contractor separately for a fee paid by the PMC. A visit to the incinerator at the Goa Medical College confirmed that it was not working and that the waste was being casually burnt. This is the situation at the state's premier medical institution! The PMC charges the private hospitals for the arrangements made by it for collection and disposal of medical waste. Building debris is collected by PMC after charging the costs to the owner and dumped in a plot behind the Bal Bhavan where it is levelled out.

The PMC has taken up vermicomposting very seriously at its garbage dump site at Curca (*see 'Good Practices' story on p.313*). It intends to introduce vermiculture bins in different housing colonies as is being done in other city areas, to reduce the waste being transported to Curca. It has also started composting waste using effective microorganisms.

Vasco — The Mormugao Municipal Council has made commendable efforts to sort out the waste disposal problem of the city. It has handed over its wastes to a private party which is attempting to compost it using microorganisms technology from Bangalore (*see good practices story*).

Ponda — For the daily collection of garbage, PMC employs 2 supervisors and 24 workers (14 sweepers, 10 labourers). In addition, PMC has a scheme specifically for collection of plastic waste. Garbage is collected daily from 6 am to 10 am and 2 to 6 pm. The main areas of Ponda town, namely the market, bus stand and Tiska are cleaned daily. The rest of the municipality is cleaned on alternate days. Approximately 12 tonnes of garbage are collected per day. This doubles during festivals. Most of the garbage (11.5 tonnes) is biodegradable, while only half a tonne is non-biodegradable. However, people also throw debris in the bins as PMC has not made any special arrangements for building debris.



PMC'S SWARM project is the basis of city's solid waste management system.

There are 3 hospitals in Ponda: one, a Government hospital called the Infectious Diseases Hospital and two private hospitals. The hospitals are required to inform PMC when sufficient medical waste has accumulated. PMC coordinates the arrangements with the three hospitals and makes a special trip for the purpose, generally every alternate week. However there are no separate arrangements for disposal and eventually the waste is thrown along with the rest of the waste at the Curti dump site.

Mapusa — Mapusa Municipality is a busy town with daily activity escalating every Friday as the famed Mapusa bazaar draws crowds of locals and tourists to the town. The garbage management situation in Mapusa is quite bad, as any visitor to Mapusa can see. The market generates a huge volume of organic waste materials, including animal bones, oyster shells, vegetable trimmings etc. The town generates its own quantum of garbage.

The MMC has installed 171 bins in the municipality. Of these, 165 are RCC circular bins located at various places in the municipality. Garbage collection starts at 6.30 am and goes on till 11.30 am in the town area and from 2 to 6 pm in the wards. The town area is cleaned every day and the wards are cleaned on alternate days. Some places are cleaned only once a week. Garbage is collected from hotels and hospitals from 6 pm to 8 pm.

No treatment system exists for any of the garbage (including biomedical waste) that is collected and all of it used to be simply emptied at the dump site on Mapusa Hill. The dump site also received industrial waste from companies as far as Verna, and sewage from septic tanks in Mapusa and Calangute. The dumpsite was permanently closed on instructions of the Chief Minister. Now the MMC garbage trucks go all the way to Curca.

Bicholim — Bicholim Municipal Council (BMC) has 10 wards with a population of 12,000 persons who constitute approximately 4000 households. Garbage is collected everyday from 8 am to 6 pm in a fixed ward-wise routine. Thus each dustbin gets cleared only once every 3 days. On Saturdays, BMC undertakes mass cleaning jobs, adding more workers to the force. All major jobs are reserved for this day.

The garbage collected is mostly household garbage. Medical waste is very little as there are only two private hospitals and one government hospital in addition to a few clinics in the municipality. The hospitals keep their

waste within their properties for the BMC to collect. There is no separate arrangement for disposal of medical waste and it is dumped along with other waste at the dumpsite.

A private contractor has been given the job of clearing the garbage from the market. Behind the BMC building, an area of 7000 sq mts has been notified by BMC as the official site for people to dump building debris.

Margao — The Margao Municipal Council's handling of its garbage is the main headache for the government at present. For years, the waste of the city was picked up and simply dumped at Sonsoddo. Now the dump is full and there is nowhere else to go. The MMC signed an agreement with Komex, to compost its garbage. The plant folded up within one year.

All the solutions are available: sorting out waste, banning plastic, house-to-house collection of waste. What is completely lacking is a commitment of the Council to its citizens. The town has already been destroyed by the PDA. Now its health will be ruined by the MMC.

Valpoi — The Valpoi Municipal Council (VMC) area is part town, part forest. This is why it is one of the greenest municipal councils of this state. The predominant occupation is agriculture, while some people are employed in the service sector. VMC has no special team assigned to garbage management but all the municipal officials and staff claim to be involved in one way or another. VMC has 11 standard RCC bins for collection of garbage in the town. These bins were given to the municipality by the Tourism Department. Today, most of them are in dilapidated condition.

Pernem — Pernem Municipal Council (PMC) comprises 10 wards having a total of about 5000 people. Not having many hotels or industries, the waste to be disposed of is chiefly household garbage and market waste. PMC has not installed dustbins in the municipality area and people, shopkeepers and other establishments simply empty garbage alongside the roads.

The garbage is collected and then physically wheeled to the dumpsite. No attempt has been made at segregating this mixed garbage. However, because the polybags fly all over the place, they are burnt on the spot. Often the workers find it easier to set fire to small heaps of garbage as they walk along the streets rather than shovel it into

Margao Municipal Council's Garbage dumping site at Sonsoddo



the wheel barrows as the latter involves more physical effort.

On Thursdays, which is market day, there is a three-fold increase in the volume of garbage. Building debris is also collected by the municipal staff wherever it is found and deposited at the dumpsite. There is no notified place and the Chief Officer does not feel there is need for one as they have not found such debris in any sizeable quantity which would create a problem.

Cacora-Curchorem — The area of the Cacora-Curchorem Municipal Council is approximately 22 sq kms. The garbage from the market area is cleared every day. Other areas of the municipality are cleared according to the quantum of waste generated. Daily, two truckloads of mixed garbage are taken to the dumpsite—one from the market areas and the other from other parts of the municipality. Other garbage such as building debris and silt from *nallahs* and drains is dumped within the precincts of the town itself, in a portion of the market area which belongs to the CCMC.

The rules require biomedical waste to be separately collected and disposed of by incineration. However the CCMC has no special arrangements for the collection of biomedical waste nor have the medical establishments made any separate private arrangements. At one hospital, we observed that syringes and drip bottles were kept in a drum at the back of the hospital. Cotton waste and food waste were thrown together in the municipal bin. Unused medicines are taken back by the suppliers while old medicines are buried. Human waste is also buried. Syringes (and needles) are destroyed before putting into the municipal bin.

Sanguem — A total of 14 dustbins are distributed among the 10 wards. A power tiller and two hand trolleys are used for collection of garbage since SMC does not own a truck. About 8-10 trolleys of garbage are collected in a day.

This system of garbage collection is being followed since 1995. However, the Vice Chairperson said that SMC is planning some improvements, e.g. newly designed dustbins with platform.

Quepem — Quepem Municipality is divided into 10 wards. Garbage is collected from 7 to 11 am daily. In the evenings, the workers do desilting of the gutters. QMC plans to have a red bin for the Primary Health Centre and two different coloured bins for the other wards.

The garbage dumpsite is situated 6 kms away from Quepem town, at Pedemol in the Panchayat area of Shirvoi. The land belongs to the Comunidade. Garbage collected from the Quepem Municipality is being dumped at this site for the last 2 years, with the permission of the panchayat. However QMC intends to request for the land to be allotted to it on lease or through land acquisition proceedings.

The area has deep pits formed as a result of illegal removal of rock/granite for construction purposes. The municipality has been simply dumping the garbage collected daily in one of the pits and once one pit was filled it has moved to another pit, some 10-20 metres away. As and when gutters are desilted, especially before the onset of the monsoons, the silt from gutters is also dumped in the same pits.

Good Practices

The *Panjim* Municipal Council is trying hard to work out sustainable and long-term solutions to the mountains of garbage generated in the city.

In July 2001, the Council placed an order for 25,000 earthworms from a Gadag based vermiculture farm, to strengthen its earthworm composting unit at Curca. It also ordered from the same source two ready-to-use earthworm based units for experimenting with management of garbage for single households. The earthworms are now helping the Council's waste managers to process a significant portion of the city's garbage at Curca.

The PMC collects between 20 to 30 tonnes of garbage per day. Of this, it claims 30% is processed by vermicomposting. The market and restaurant waste, collection of which is given on contract basis, goes for vermicomposting directly, as it is segregated prior to collection. (Some of it goes to the animal shelter at St Inez where it is used to feed the stray cows that have been impounded by the Council.) The PMC has taken up vermicomposting very seriously at its garbage dumpsite at Curca. Mr. Mazhar Farouqui is in charge of setting up the vermicomposting project. He has trained a team comprising 6 women for segregation of garbage and assisting with composting operations, 1 foreman for segregation of plastic from general market waste and 1 supervisor whose job it is to ensure that fire does not spread beyond the quarry.

PMC has built a shed at the Curca dump site with 14 vermicomposting beds. Two other sheds store the equipment needed for disposing of the garbage. PMC has a tiller, with 2 attachments, one for shredding and turning garbage and the other for moving it from one place to the other.

The waste is first shredded by the tiller and then partially composted, using a herbal mixture. This

is done to speed up the composting process. The partially decomposed matter is next put into the vermicomposting pits and earthworms are introduced. This is then covered with damp sacks. When the compost is ready, it is used in the municipal gardens of *Panjim* or sold at Rs 2 per kg.

PMC has also recently commenced trials using Effective Microorganisms (EM) technology for garbage degradation. The selected microbes are supplied by the ICAR which now conducts training courses for those interested in using microbes for digesting their garbage.

Vasco — The Mormugao Municipal Council's garbage treatment facility is the first major garbage handling facility that is based on microbial cultures. The facility is located 1 km away from MPT colony, Sada, Vasco. It is managed by Chemtrol (manufacturers of gas analysers), which has an office at Vasco and a factory unit at Kundaim. The garbage treatment facility plant is operating since the past 12 months.

The site is walled on all four sides and the floor is cemented. Trees are planted alongside the wall along the road and the plantation is intended to absorb smoke and smell, and to prevent both from permeating outside the walls where it could function as a nuisance to passersby. Inside, however, the place smelled strongly of decomposing garbage and there were plenty of stray dogs inside the compound.

40-50 tonnes of garbage are received per day (of which 45% is organic, 3% plastic). Raw materials used in the microbial process include segregated organic waste and a mixture of culture, water and cow dung. The machinery includes a loader, rotating cylindrical sieves, perforated pipe, compressed air generator and drums for mixing culture.

Bacterial (fast decomposition, odour controlled) technology has been adopted from the University of Agricultural Sciences, Bangalore.

The waste is first separated as far as possible into biodegradable and non-biodegradable categories. Glass and plastic are also removed. A mixture of culture, water and cowdung is mixed with the organic waste and a pile is gradually built up, using the Windrow method. The temperature in the pile rises upto 70 degrees. The waste is turned every 8 days (6 turnings in 45 days). The moisture content is maintained at 50% to 60%.

After 45 days the composted material is transported by a loader and run through a cylindrical rotating sieve. The product obtained is called first-grade compost.

First-grade compost is next run through another sieve to get the final product. The final product looks like tea powder and it has no smell. It is packed into sacks and sold with the brand name KRISHAK (soil enricher) in 50 kg HDPE bags. It is marketed as 100% organic fertilizer processed from city market wastes.

The unit is now trying out an innovation to speed up the process of decomposition. Organic waste, mixed with culture, water and cowdung, is piled over a perforated pipe which lets out compressed air at 100 psi (pressure for 20 minutes). As a result, the turning of the compost material is eliminated and the process takes only 3 weeks. However, the fresh garbage has to be covered with 6 inch layer of first grade compost to facilitate the process.

The unit proposes to use a conveyor belt to transport material. The compound wall is also being raised.

Strangely, the unit is considering the use of vermiculture to improve quality of compost.

The unit also proposes to enrich the compost by preparing special mixtures.

Ponda — Ponda Municipal Council (PMC) participated wholeheartedly in the Plastic Free Goa campaign and when the campaign ended, PMC decided to continue the collection of plastic waste separate from the regular garbage. Therefore, PMC engaged 2 labourers on daily wage basis who go house to house collecting plastic waste.

Although at the start of this scheme, the days these workers would visit the different wards was announced on cable network scroll, presently the Municipal Council does not maintain a record of how they work. However, every day they bring in two or three sacks full of plastic which are kept in a shed in PMC's premises.

At first, when a truckload of plastic waste accumulated, it used to be sent to the North Goa plastic dumpsite at Assagao. However after the dumpsite for plastic was discontinued, PMC made arrangements with Mr. Babajan, a local fruit-seller and scrap dealer who has agreed to take away the plastic waste.

Panjim Municipal Council's earthworm beds for composting garbage (Curca)



SOLID WASTE DISPOSAL — VILLAGE PANCHAYATS

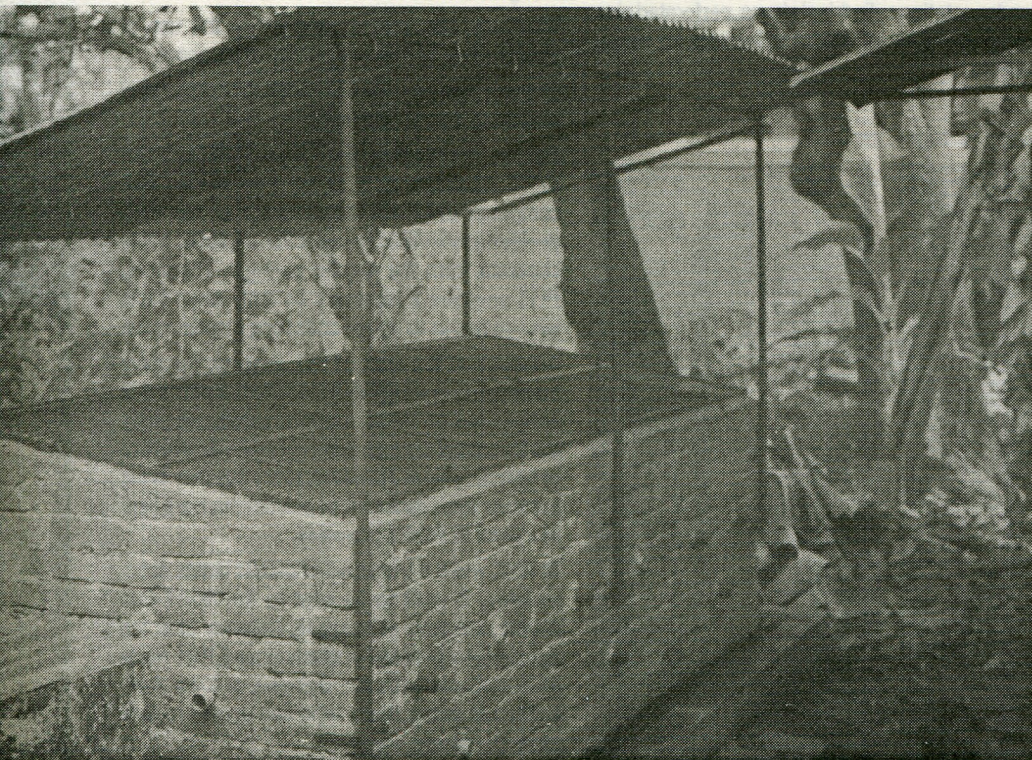
In Goa, organised collection of garbage was for long restricted to municipal and town areas only, as people in villages managed the disposal of their own garbage, which in any case was chiefly of organic nature. Biodegradable waste is generally well managed in the villages as waste food is given to pigs and other animals, and farm waste is often composted.

Recent years, however, have seen tremendous increase in the volume of household garbage even at village level. Also, with increase in non-biodegradable waste and toxic materials, increase in population and the common practice of backyard burning, the villages, once seen as garbage free areas, are showing signs of air pollution, which is detrimental to the environment and to human health.

As people have no idea of how to dispose of non-biodegradable waste, they get rid of the problem by simply throwing the waste in open areas, in *nallahs* and alongside village roads. Such a manner of disposal of garbage is problematic: it pollutes the environment, chokes *nallahs* and drains and also destroys the beauty of the countryside.

With a view to control the collection and disposal of garbage in the State of Goa, the Goa Government enacted the Goa Non-biodegradable Garbage Control Act which came into force in January 1998. The Act is applicable to all the Municipal Councils and all villages of the State. The rules set out procedures expected to be followed by local bodies in waste handling. The Village Panchayats (VPs) are responsible for managing the village waste, its collection, transport, storage, and treatment.

Three chamber earthworm bin for treating garbage in rural areas



The Act and Rules require the local authority to set up an organised system for collection and disposal of garbage with separate collection of biodegradable and non-biodegradable garbage, proper disposal facilities, special service for biomedical waste, separate disposal for hotel and industrial wastes, segregation of garbage at source, formation of Garbage Management Zones and Garbage Management Committees, and enforcement of penalties for offenders.

To enforce the garbage rules, circulars were sent by the Block Development Officer (BDO) to the panchayats informing them to provide separate coloured bins and also to form garbage management committees in accordance with the rules. However the regulations have by and large not been implemented by the authorities. Out of the 33 panchayats in Bardez, not even one has a scientific method of waste disposal.

Bardez — Villages have different characteristics when compared with cities and these features need to be considered while planning for waste management. Houses are often spaced out, sometimes quite far away from each other. Sometimes there are no roads leading to the houses or the roads are too narrow for heavy vehicles to reach them.

So people just burn the biodegradable garbage and wait for the *lamanis* to collect the non-biodegradable stuff. A new trend is for people to fling their waste into someone else's compound, especially if it is uninhabited. Those who stay out of Goa for most part of the year find that their homes have been conveniently used as a dump yard. Rivers, *nallahs* and other waterbodies are also convenient places where waste is easily dumped.

Multi-storeyed building complexes are a recent phenomenon in villages and they do not have in-built systems for collecting and dealing with waste. Moreover, unlike the cottage-type houses, the residents of building complexes do not have free open space to compost or even burn garbage. As a consequence they simply pack their garbage in plastic bags which are then thrown in other parts of the village, e.g. *nallahs* and roadside corners, or if they have some personal transport like scooters, the garbage is even dumped in other villages on the way to work.

The panchayats generally pointed out two principal difficulties faced by them regarding proper garbage management:

1. *Lack of funds*: The first and most common obstacle raised by practically all panchayats is lack of funds. Most of them have said that the government should provide the funds. On the other hand, none of the panchayats levy any garbage tax except for Calangute which charges only the hotel owners.

2. *No dump sites*: There are no dump sites, leave alone a waste management site, for dumping garbage even if the panchayats are

willing to collect it. For example, Candolim panchayat is willing to collect the garbage but has a problem of where to dispose of it, due to non-availability of a legal dumpsite. Saligao panchayat collects non-biodegradable waste on a monthly basis. They do not know where to dump it.

Waste management is thus generally seen in terms of bins for collection of garbage, and a quarry for dumping the waste. All panchayats associate quarries with dump sites. People, however, resent installation of bins since it is their experience that bins soon become eyesores and a health hazard with all the flies, rats, stray dogs and cows that congregate round a bin. Hence no one wants bins near their residences.

The following are some of the schemes initiated by panchayats, NGOs and citizens in North Goa for dealing with garbage:

Verem Villas: The residents of Verem Villa have two bins with proper cover for accumulating their nondegradable waste which is collected on a weekly basis and a vermicompost pit is built to compost the biodegradable waste.

Saligao: The Saligao panchayat along with Saligao Civic and Consumer Cell organises a monthly drive for collection of non-biodegradable garbage. The drive is announced in the church and also by word of mouth.

Calangute: The Calangute Residents and Consumer Forum and the Calangute panchayat together organised Sunday drives for collection of plastic waste during the Plastic Free Goa campaign. These drives were very successful and people would make the effort to accumulate their plastic waste during the week and hand it over to the volunteers.

Sapna Gardens: This is a residential colony in Socorro panchayat which has started a garbage disposal system under the guidance and management of one of its residents. A small place in the colony was allocated for four bins—one each for biodegradable waste, metal and glass, plastic and sanitary napkins.

Beaches: The Tourism Department installs the bins and has workers to sweep and keep the place clean. However, it expects cooperation from the panchayats for disposal of the garbage. But sometimes garbage is not lifted for days as the panchayats look on it as an additional job, at which point the workers just burn the garbage in the bins itself.

Plastic Ban: During the Plastic-Free Goa campaign the people were made aware of the problems associated with disposal of waste plastic. As a result, a number of panchayats have passed resolutions asking for a ban on manufacture and use of polybags and PET bottles. These are Anjuna, Arpora-Nagoa, Calangute, Candolim, Penha De Franca, Pilerne-Marna, Socorro and Tivim.

Salcete taluka has 29 panchayats to govern its villages. The Non-Biodegradable Garbage Act has not been implemented in any of the villages of Salcete and most people burn non-biodegradable garbage in their backyard. Another problem is the volume of litter found in public places, especially in the coastal areas which are frequented by tourists and other local visitors, e.g. Colva beach which is a very popular beach and is the most littered.

As in Bardez, the construction of buildings and colonies, most of which have no proper system for collection

of garbage or its disposal, is creating new problems. As a result, garbage is dumped in open areas at the side of roads or in *nallahs*. These areas are sometimes cleaned by the panchayat on *ad hoc* basis by simply making arrangements for a truck and labourers. Even then, as there are no authorised places in the villages for disposing of the garbage, it is either dumped at the nearest municipal dumpsite or more frequently burnt at the site.

Attempts by some panchayats to put garbage bins in some areas of the panchayat without first educating the public regarding segregation of garbage, organising the collection of the waste and having a proper disposal site have led to indiscriminate dumping of garbage in the bins which soon start overflowing with waste.

The panchayats which make arrangements for collection of garbage have adopted various methods for disposing of the waste. Some say that they dig pits into which the garbage collected is dumped and the pits are thereafter closed. Some burn the garbage at site. In places where the volume is large, garbage is sent to the Cuncolim municipal dumpsite or Sonsoddo.

Many hotels engage contractors for collection of garbage. The contractors are supposed to take the garbage to the nearest municipal dumpsite. Panchayats, however, complain that garbage is unauthorisedly dumped at isolated spots in villages. The hotels, however, were unaware of the exact arrangements for garbage disposal and they said that it is the contractor's business to adhere to the proper procedures.

Organising collection of garbage in villages (as was done during the Plastic Free Goa campaign) is also an expensive exercise as houses are spread out and the population density is less than that in a city.

Garbage Management Committees have been unsuccessful as the concept of segregation and organised collection is new and enforcing it would require well chalked-out programmes supported by necessary funding and public awareness programmes, followed by strict enforcement by the authorities. While a few panchayats say that they do not have a garbage problem in the village, most recognise that garbage management is a new problem they have not dealt with before. Many panchayats say they can organise collection of garbage if a site for disposal of garbage and transport facility is provided to them.

Most panchayats have allocated funds this year for dealing with garbage but no plans have been chalked out for garbage collection and disposal, except for periodic drives organised with assistance of local NGOs etc.

Neither the municipal nor the panchayat authorities insist on separate arrangements for collection and disposal of biomedical waste.

In schools children are being sensitised to the problem of dealing with garbage. However, much remains to be done in terms of public involvement for organised collection of recyclables and encouraging the practice of composting of biodegradable waste.

The need of the hour, according to most panchayats, is for a waste disposal and management site to be earmarked. Secondly, the public has to be made aware of the regulations and their enforcement. Last, but not the least, funds are required to put up the infrastructure.

Till then, Goa is steadily drowning in its own garbage.

Goa Foundation: Using Earthworms for Domestic Wastes

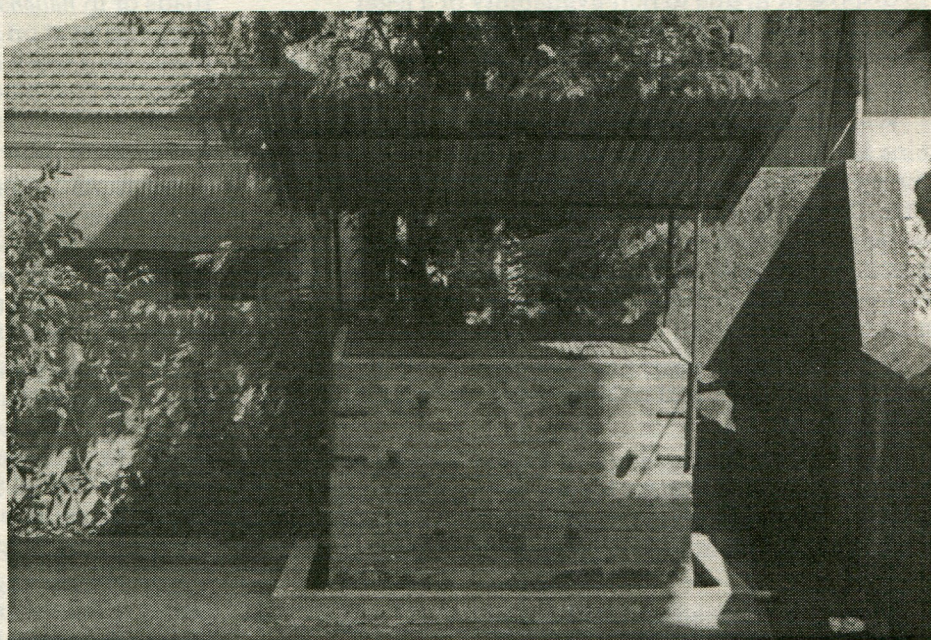
In March 2001, the Goa Foundation, supported by the Department of Science and Technology, embarked on a project for helping village panchayats and municipal councils to implement garbage regulations in force in the State of Goa. After circulating relevant information on garbage regulations in different panchayats and municipal councils, the Foundation moved over to the second phase of its project, which was to work on practical designs for earthworms bins for processing garbage.

The Goa Foundation earthworm-based garbage project was carried out at four different sites, namely: Assagao, Mapusa, Parra and St. Inez. Vermicomposting units were constructed at each of these places and staff of the Foundation have been monitoring performance. The experiments have been successful.

The Foundation has been using two species of worms for the experiments: *eisenia foetida* and *eudrillus eugenia*. These two species are generally used in the processing of garbage all over the world. The Foundation, however, sought to know whether they would work in Goa too, where there are a large number of worm-predators including rats, lizards and ants. The earthworm bins also had to be designed to suit the exigencies of the climate: Goa receives heavy rainfall for four months during the monsoon, followed by a dry season of eight months. The bins were therefore constructed above the ground level so that they did not get flooded in any manner during the monsoon.

Two Zoology students from Dhempe College adopted the bins for their project work and submitted a detailed evaluation of their efficiency to the Foundation.

The designs of these bins and the selection of appropriate species of earthworms were done in consultation with Patil Vermifarms from Gadag,



Vermicomposting unit with two chambers in the St. Britto's Apartments, Mapusa.

Karnataka. The bins were constructed by local masons using the cheapest class of burnt brick and the covers and roofing were fabricated in local garages. Pictures of the brick bins are given alongside.

The capacity of the bins was worked out keeping needs of different users including single residential units, flats, institutions including factories, schools, departments and restaurants.

The best resource for vermicomposting is locally available organic material. A vegetable grower or a vendor can use rotting vegetables, a dairy farmer can use cattle dung, a farmer can use agro-waste, a person at home or at a restaurant can use kitchen waste and so on. However a close watch must be always maintained on the

worms. Too much heat or too much water can both be hazardous for the creatures. The bins must have the proper temperature and humidity. It is important that trained persons be involved all the time in the maintenance of the bins.

However, the Goa Foundation staff is ever willing to assist Panchayats and Councils which may want day to day supervision when these bins are being constructed. The Foundation will also arrange to supply earthworms at their market cost from reliable suppliers.

Local earthworms can also be used for processing of wet garbage. However, these are generally available in large quantities only during the monsoons.

Besides the Goa Foundation, the Panjim Municipal Council, the Taj Hotel Group, and a few other people are at the moment using earthworms for processing wet garbage. Progress is slow because there is no pressure exerted by citizens or councillors on Municipal Councils to go in for such vermicomposting on a large scale. Councils and panchayats have learnt to simply dump wastes, wherever they can find convenient places to do so. However, Goa has already run out of suitable places for dumping of garbage. The Mapusa garbage dump, for example, was closed down in July 2001 due to protests from people living in the Goa Housing Board colony. Mapusa wastes are now taken to Curca: because of this, the life of the Curca dump is now nearing an end as well, to the profound dismay of the Panjim Municipal Council. The Sonsoddoo garbage dump is already completely full and the garbage trucks are dumping their wastes outside the gates, and it is now flying all over the place.

Despite this crisis situation, and tested technologies like earthworms, the authorities continue to remain unmoved.

Vermicomposting units at PFA animal shelter at St Inez in Panjim



Natural Springs

Due to its peculiar topography, a large number of springs emerge particularly in the area of the plateaus, and their medicinal and rejuvenating qualities have become integrated with local folklore. Each spring in Goa has been endowed with special efficacious qualities. In many of them, steps have been taken, sometimes by villagers themselves, and sometimes by the administration, to protect and preserve them.

A large number of the springs like the Ambora Spring in Raia village, are ferruginous (iron bearing). The Ambora fountain is built in the shape of a well and the water is reputed for the treatment of skin eruptions.

There are two springs in Candolim in Bardez within the Aguada fort. One of these is known as Socoile (Lower spring) and is believed to be effective against itch and other skin diseases.

The minor spring waters in village Batim also contain iron and people believe that the water is a good blood purifier.

There are springs like Fondvem in Candolim and Vell in Caisua which restore lost appetites. Bimbol in Sattari, Fatorpa in Bali, Raidor in Cavelossim, Gongo in Nachinola, Torvalet in Shiroda have light carbonic and sulphurous qualities.

The springs of Curca, Mercedes and Boca de Vaca are known to be perennial. Other popular springs include Kesarval, Salmona in Saligao and springs in Keri, Ponda and Pomburpa.

In the Ponda area, a large number of the springs emerging from the plateau have been judiciously collected in tanks, and form the basis of traditional irrigation systems.

The NIO, as part of a study, surveyed the water quality of 17 springs in Goa. Results of the study are given in the table below. The study made the following recommendations:



• Since spring water is considered safe for drinking purposes, considerable developmental activities are essential to maintain the springs and their surroundings clean. At present it is observed that water is collected in tanks adjacent to the springs and is used for bathing and other domestic purposes, thereby contaminating the outflow considerably. Alternate facilities for such uses of the spring water should be provided in the vicinity, to maintain the springs in their pristine condition.

• The surroundings of the springs should be cleaned periodically and the greenery around should be carefully maintained.

• Most of the tanks of the springs are full of algal growth. They should be cleaned periodically.

• Periodic monitoring of the water quality of the springs, chemically and microbiologically, should be carried out.

• As of now, all the springs, except those at Curca, Mercedes and Betul, have very good water quality.

Chemical and microbiological results of the study reveal that the waters of the springs are free from contamination and are relatively clean and suitable for drinking purpose.

However, care has to be taken in respect to Curca, Mercedes and Betul springs as some of the constituents, chemical and biological, appear to be fairly high.

Despite these well-meaning recommendations, many of the well-known springs are under attack. Citizens from Mapusa, for example, recently called in hydrogeologist James D'Cruz, to examine the pollution of the Cuchelim Spring. Mr. D'Cruz visited the site on behalf of the villagers and filed a report recommending that no water from the spring may be used for drinking purposes, as it was being infiltrated from the overflow of several septic tanks constructed in an area above the spring.

The Tourism Department's assault on the Salmona springs in Saligao is documented elsewhere in this chapter. The Dorvol springs have been destroyed by effluent from Zuari Industries. In Ponda, the main *nallah* that flows through the town and its several contributing springs are the focus of a renewed effort at restoration by Nirmal Vishwa.

The government has finally set up a committee to oversee the 'development' of some of these springs for purposes of tourism. Accordingly, the Boca de Vaca spring in Panjim and the Ana Fonte in Margao are being done up so tourists can visit them.

Results of NIO study of 17 Springs

	Total Heterotropic Bacteria*	Total Coliforms*	E.Coli like organisms*	Vibrio like organisms*	Vibrio Cholerae like organisms*	Salmonella like organisms*	Shigellae like organisms*
Kansarpal	1.28	—	—	—	—	—	—
Cunchelim	2.37	1.7	0.15	0.03	0.01	—	—
Xelpem	1.82	1.53	0.13	—	—	—	—
Pomburpa	1.82	0.8	0.11	—	—	—	—
Baradi	1.01	0.16	—	0.08	0.02	—	—
Betul	15.71	0.6	0.19	0.64	0.28	0.1	0.19
Camurlim	3.47	0.49	0.09	0.24	0.02	—	—
Devots	0.95	0.17	—	0.58	0.17	—	—
Fontlem	5.12	0.25	0.06	0.13	0.07	—	—
Palonda	0.69	0.06	—	—	—	—	—
Velenghor	2.36	0.55	0.17	0.19	0.04	—	—
Verna	1.0	0.62	—	—	—	0.04	—
Kesarval	7.5	1.36	—	0.05	0.05	—	0.04
Curca	0.85	0.18	—	—	—	—	—
Merces	6.06	0.37	0.2	0.12	0.08	0.12	0.22
Boca de Vaca	1.36	0.66	0.28	—	—	—	0.04
Mala	0.57	—	—	—	—	—	—

*CFU (Colony Forming Units) per ml.

THE SALMONA SPRING STRUGGLE

The Salmona spring has been one of nature's many gifts to Saligao, and it has for generations supported life in the village. Villagers use the water for drinking, cooking, bathing, domestic and commercial washing of clothes, watering of cattle and local construction needs. In the dry months of March, April and May, people from distant parts of the village use the spring for domestic water. School students, boy scouts and girl guides, and neighbouring villagers use the spring for excursions, jamborees, picnics, nature walks, camps, and some local residents are also seen snatching a few moments of quiet solitude in this peaceful retreat.

But tourism nearly destroyed this sylvan treasure of Saligao. Nude hippies, drug users, drunk tourists, Goan tourists on holiday all began to invade the spring. An unscrupulous Catholic priest from Calangute threatened to install hippies in a house he owns at the spring.

As if this planned invasion was not enough, the Tourism Department came on a very rainy morning in June 1988 to officially takeover the spring. Fortunately, some vigilant villagers from the Saligao Citizens' Action Committee heard about this top secret visit and alerted the others the previous night. Forty concerned, very vocal and agitated villagers were there the next morning at the spring. 'The Tourism Department is not welcome in our village,' the villagers told the Director of the Tourism Department. The Director beat a hasty and subdued retreat. The villagers have not heard from the Department since. Subsequently, at a Gram Sabha in the village, over 200 villagers gathered to unanimously vote against the Tourism Department or any other government department taking over the spring.

Later in a signature campaign organised by the Saligao Citizens' Action Committee, over 800 villagers signed a memorandum to the panchayat, to keep the Tourism Department away from Salmona and to preserve the spring for the water needs of the village. Some of the youth involved in the earlier Right to Water Case, rallied together, took up a collection and repaired some of the damaged masonry at the spring. They decided to look after the maintenance of the spring every year so that its water continues to be used to sustain life in the village.

The Salmona spring struggle uncovered a new pattern of tourism promotion in Goa: the Tourism Department is going for all natural waters available, to turn them into tourist attractions. Salmona was to have a hotel, a few bars, with some swings and slides thrown in for good measure. The spring itself was to be done up with hideous bathroom tiles!

The spring at Pomburpa in Bardez is a point in case. The Tourism Department took it over. The result is that the village has lost its natural spring. The government has gained one more tourist attraction—every week before being dumped at the Friday Market at Mapusa, bus loads of chartered tourists from the Baga-Candolim belt are first let down at the Pomburpa spring. The site presents a hideous picture, and not even a bare trickle of water is to be seen. The natural surroundings have been replaced by stone benches, plastic litter lies all around and there is a noticeable stink in the area.

SANGOLDA AND SALIGAO: THE RIGHT TO WATER CASE

In Sangolda, Saligao and Assagao, villagers are struggling to fight three murderous monsters who intensely desire their water—the hotel trade first, second, the construction industry, and third, the Pilerne industrial estate. These monsters, instead of asking the government for their fair share of water, recruit tankers to illegally tap wells in these villages. As a result, aquifers fall and local people are deprived of water for both drinking and for agriculture.

In these three villages, a few farmers have been selling water to building contractors, hotel owners along the coast and recently to industrial units. Some of this business has been going on for a decade. The *modus operandi* is quite simple. The farmer applies to the Rural Development Agency (RDA) for a loan to dig a well for irrigating his crops. After the well is dug, the farmer does not grow anything, but uses the well to sell underground water for money. The RDA is not concerned with any misuse of its loans, despite being fully aware of the abuse.

Sangolda — This village has the distinction of having several water peddlers. Each of them sells on an average 75,000 to 90,000 litres of good potable water everyday, to quench the monsters' thirst. The satisfied animals are not ungrateful; they belch up a monstrous tip in gratitude—Rs 150 per trip of 6000 litres (this is the rate for the water only). One Saligao peddler has since reinvested his profit into a new Mitsubishi Pickup which he now uses to transport the water he sells.

Each farmer can make around 15 such trips—each trip fetching him Rs 400. Much of the water from this well also fills the swimming pools of luxury hotels in Baga. Business flows at a steady gush for a little over eight months a year.

In each case, it amounts to an annual loss of 21.6 million litres of wholesome drinking water from the common underground water table. An average family uses 200 litres of water everyday; this means that each water peddler deprives 450 village families of drinking water every day.

The most tangible result of this irresponsible sale of a community resource is drought. If anyone overuses a well, he automatically lowers the common underground water table; this affects the levels of all the other wells in the area, as they are all connected to the same water table. This is common village knowledge, and is part of farming wisdom anywhere in the world. Local scientists who are familiar with the hydro-geology of Goa also agree. One such technical expert was Prof. Frank Antao of the Department of Geology in Dhempe College, and a member of the Technical Advisory Committee for the Western Ghats Development Programme, Government of Goa.

In a report entitled *Geo-Hydrological considerations for the Sangolda village area*, later submitted in the Court of the Civil Judge at Mapusa, Professor Antao had this to observe about two wells being overused in Sangolda, '... as a result of such large-scale withdrawal of groundwa-

ter, the water table would be lowered, especially at its lowest seasonal level (April/May).'

This situation of drought causes a lot of misery in our villages. People, domestic animals, poultry and livestock do not have enough water to drink; domestic agriculture and horticulture come to a standstill; underground moisture disappears to the extent that traditional dry crops like beans (*horsande* in Konkani) and groundnuts become impossible to grow; villagers plant fewer trees because there is neither water to maintain them, nor underground moisture to sustain them on their own.

The sum total of all these factors slowly but surely changes the ecological balance of the area beyond repair. In his report Professor Antao concluded: 'It may be noted that excessive withdrawal of water over and above the safe factor could cause an annual lowering of the water table with cumulative effects. This situation could dry up the village wells.'

Naturally the thirsty villagers of Sangolda and Saligao tried various ways to alleviate their sufferings and get relief. Like good, democratic, law-abiding citizens they first looked for salvation in the bureaucracy. It was a new experience—this bureaucratic maze! In and out they ran; round and about the labyrinthine corridors of officialdom they scurried. *Sarpanches* and panchayat committees, BDOs and Mamlatdars, PWD and Electricity Department Engineers, RDA Directors and District Collectors, all were met, several times over, by individuals and delegations.

Everybody was sympathetic. Some promised to look into the matter. Some promised to confiscate the pumps; others to disconnect the electricity to the pumps. Still others threatened to close the wells. One promised to recover all subsidies from the water peddlers. But nobody did anything; none of these promises was kept.

The PWD along with the panchayats did do something, but in another direction. It saw this as a golden opportunity to bore new wells! In Sangolda, the borewells in one affected *vaddo* did not yield any water; so after the PWD spent Rs 15,000, all that the people had to show for their frenzied escapades in the bureaucracy was a dry waterless bore. In Saligao, the affected *vaddo* at least responded with a water yielding bore; the PWD was good enough to install a real handpump but the pump did not have a handle and so it was as good as not being there.

After being betrayed by the government machinery, the villagers of Sangolda turned to the courts for help. The courts responded with an *ex parte* injunction. In his order the Civil Judge, Senior Division at Mapusa declared: '... I am satisfied that the immediate intervention of this court is called for to restrain the defendants, their servants and agents from selling or supplying water from the said wells pending the hearing and final disposal of this application ...'

The villagers' hope, however, was short lived. The very day after the court injunction, the well owners were about their criminal business again! And they continued their activity, despite a police complaint.

On April 28, 1988, the Civil Judge, Junior Division at Mapusa confirmed the temporary injunction. Environmentalists in Goa rejoiced at this progressive landmark judgement. The earlier temporary injunctions had been unprecedented and the case was now poised to create legal history.

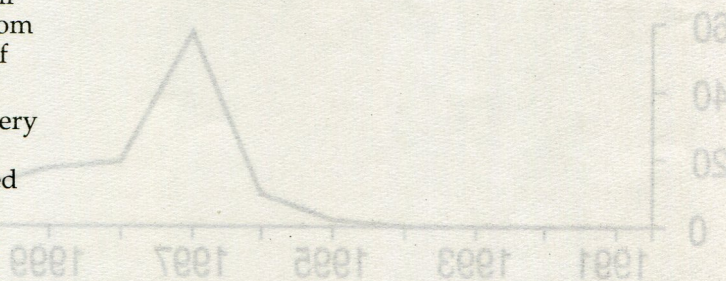
Saligao — A very hard working group of public spirited youth, for over a year, built up a strong case, along parallel lines to the Sangolda one. But at this stage they made a mistake. Instead of filing the case themselves, they gave the entire file of original documents to a local village worker of a regional political party who promised to take this up as a political issue. The file simply disappeared thereafter. One year of struggle and hard work by a group of responsible young people disappeared overnight, quite obviously for political and election gains.

In the meanwhile, not to be denied their illegal profits, the water sellers affected by the Sangolda order went in appeal before the Sessions Judge at Panjim.

The Sessions Judge failed to appreciate the elementary scientific phenomenon of how the common underground water table is depleted by overdraft. He modified the earlier historic order of the Civil Judge and allowed the water sellers to bleed the water table for nine months of the year. He forbade their criminal activity for only the months of March, April and May—by which time they had already sucked the water table dry anyway!

And so these situations of injustice were back to square one, till the Government felt compelled to bring out the Groundwater Regulation Act to control the removal of water for sale. Surprising to relate, the villages of Sangolda, Saligao and Assagao were not listed in the original schedule to which the Act was to apply. Obviously, water peddlers have adequate influence to keep them out of the reach of the law.

Mario & Muriel Mascarenhas



THE RESURGENCE OF MALARIA IN GOA

As evidence of the deteriorating status of Goa's environment, the incidence of one key indicator of ecosystem disturbance, the malarial parasite, is on a terrific increase, with malaria cases in certain areas shooting up by 5,000 cases every year. Despite stringent provisions in the Public Health Act and other legislation, builders still keep water untended for curing during construction, providing environments for mosquitoes to breed. The sanitation situation, with overflowing soak pits, creates one more breeding ground for the creatures. Disturbingly, *plasmodium falciparum* cases (the dreaded Japanese encephalitis) are on the increase. Worse, it is reported by the National Malaria Eradication Programme (NMEP) that a strain of *p. falciparum* which is resistant to newer anti-malaria drugs is now to be found in Goa.

Dr. Maria da Silva Gracias in her book *Health and Hygiene in Goa*, reports that malaria was quite rampant in certain areas of Goa during Portuguese rule. Its prevalence was high particularly in Sanguem taluka, where, between the years 1900-1910, about 6,000 people died due to this one illness alone. More than 15 villages disappeared from the map. So too did four villages in Canacona.

Today, we are seeing a major resurgence of this disease. This increase has happened in the '90s with deaths due to malaria occurring from 1995 onwards. The problem seems to be on the rise every year, despite the

efforts of the public health authorities. The year 1998 saw 25,975 cases, which indicates that one out of every 50 Goan citizens was severely affected.

Till around 1992, there was a fair degree of complacency on the malaria front. In the early '90s, the annual study report compiled by the Directorate of Health Services informed us that the department has been successful in arresting the rate of spread of malaria all over Goa. It also stated that the capital city was vulnerable to the Anopheline mosquito which is rampant thanks mainly to the spate of construction activity carried out here. Thus, jungles of concrete can very easily replace moist tropical jungles in providing breeding sites.

A separate study by Mr. M.B. Kaliwal of the National Malaria Eradication Programme in the early '90s, entitled '*Buildings under Construction Contributing to Breeding of Mosquito Vectors of Malaria, Filariasis and Dengue Fever*' stated that 'in urban areas, construction activities are creating mosquito-genic conditions leading to mosquito nuisance or the spread of mosquito diseases on a wide scale.' Of the 104 buildings surveyed all over Panjim at that time for the presence of mosquito-conducive environment, 61.5 per cent of the construction sites were found to be mosquito breeding, thus implying that construction companies pay very little or no interest to such health hazards while going about their job.

All this should have led to alarm bells ringing. Sadly, very little was done. Today, the problem has reached epidemic proportions. A disturbing, albeit unsurprising, trend that has been noticed is that most of the cases come from the urban areas with Panjim comfortably leading

Malaria deaths in Goa (1991-2001)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001 (upto Sept.)
No. of Cases PV	2380	648	1894	3181	3630	10093	15198	17281	NA	NA	NA
Cases PF	499	203	333	275	256	1539	5827	8694	NA	NA	NA
% of PF to Total	17.3	23.9	15.0	8.0	6.6	13.2	27.7	33.5	NA	NA	NA
No. of Deaths	Nil	Nil	Nil	Nil	2	10	57	19	17	11	11

Note: No malaria deaths were reported between 1963 and 1994. Death figures may be misleading. Death after recovery, but due to general debility caused by malaria, is often reported as being due to other causes.

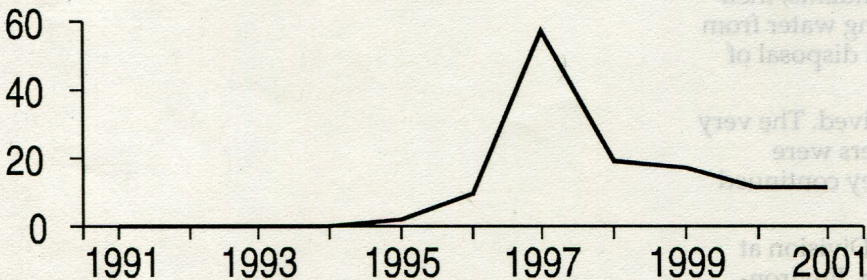
*PV = *Plasmodium vivax*

*PF = *Plasmodium falciparum*

Malaria endemic areas - 1997

No. of Cases		PV	PF	Total
Panjim	UHC	5148	2442	7590
Aldona	PHC	1339	939	2278
Candolim	PHC	3316	1517	4833
Corlim	PHC	1145	279	1424
Margao	UHC	1958	408	2366

Note : These five centres account for 85.4% of total reported cases in Goa in 1997



Report on Goa's Health

This is the first readable survey of the state of Goa's health. It was prepared by huge list of doctors, activists and professionals under the active direction of the Sangath Society for Child Development and Family Guidance and completed in 2001.

The report covers various areas including malaria, HIV, traffic accidents, migrant workers and the impact of industries like tourism and mining on public health.

It also has an interesting section on indigenous medicine, its concepts of diagnosis and treatment, and on *gauvti vakot* (country medicine).

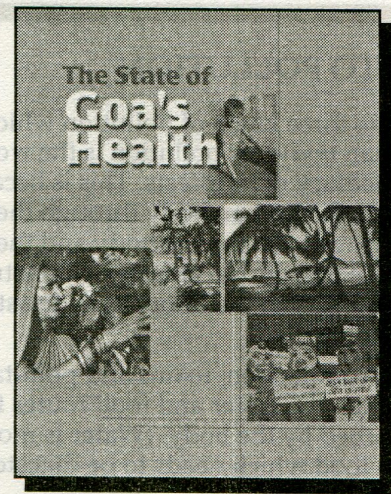
It concludes with a fairly critical review of the pharmaceutical industry in Goa and ends by demanding a rational drug policy for the state.

Essential reading for any person who is interested in an intelligent and fairly comprehensive overview of public health in the state.

Get a copy of the report from Sangath at the following address:

Sangath Society for Child Development
841/1, Behind Electricity Department,
Alto Porvorim, Goa 403 521

The report is priced at Rs 60.



the pack. The National Highway and the Konkan Railway have contributed in no small measure by creating severe drainage problems in several places and interfering with the ingress and egress of saline water from these areas. This has provided one more breeding ground for mosquitoes. It is small consolation to the beleaguered citizens to be able to say 'I told you so' with respect to the Konkan railway, when they are under threat all the time. As the table shows, malaria cases have been at a high level ever since construction began. Now that the railway is complete, this appears to be a problem that the people will have to learn to live with.

Most of the areas which are identified as being particularly malaria prone are urban in nature. Panjim and Margao come first and third respectively in malaria occurrence during the year 1997. Candolim PHC (including Calangute), which lies second in this race for dubious honours, though ostensibly a panchayat area, is, as is well-known, a thoroughly urbanised area. This area has been witnessing a tourism and construction and between the rubbish dumped by builders and garbage generated by the tourism industry, the mosquitoes are provided with plenty of salubrious areas in which to breed. Aldona PHC cases are related essentially to Porvorim, a major suburb of Panjim. And lastly, Corlim covers the Panjim suburbs of St Cruz, Mercedes and Bambolim.

The government seems incapable of taking any action against offenders like builders who are not taking proper measures at their construction sites. The Bombay High Court at Panjim has been gamely attempting to supervise the carrying out of the antimalarial programmes of the various municipalities and panchayats. Few people know what to do with the modern bureaucratic zombies manning most of these institutions: they simply do not care, even when their own kind get killed. They have to be constantly prodded into action by the Court. But for how long? The health authorities have been unable to cope with the problem and instances of deliberate under-reporting have come to light. The common sight of statutory authorities failing to act, thus forcing the courts to intervene, has been repeated once again.

In an incident that left citizens speechless, the Government decided to purchase Deltamethrin, an insecticide, to curb the mosquito problem. Questions were then raised regarding the safety and efficacy of this chemical and there was widespread opposition to the spraying. The issue was kicked around for some time. It was revealed

that the Government had gone in for the purchase of this chemical without proper study. It surprised no one when the next revelation was that the supplying company had some connection with family members of leading politicians. Of the 4500 kgs purchased in September 1997 at a cost of Rs 31 lakhs, 500 kgs were used to spray 5,500 rooms in 900 houses, with only reluctant acquiescence of the occupants.

And to put an end to matters, it was decided not to use the insecticide on which a large amount of public money had been spent. It lies in a godown at present, steadily rotting away. The public is so resigned to these displays of waste, incompetence and corruption that the issue has been forgotten.

But this sad tale has a hopeful epilogue. In what is now a predictable tale in Goa, it was court intervention that finally improved matters. On the basis of an article in *The Navhind Times* on 24th June 1997, cognisance was taken *suo moto* of since it related to public health. The Directorate of Health Services had to file affidavit after affidavit as the Court found each one unsatisfactory. The Court pointed out that the Government was not effectively implementing the Malaria Action Programme under the National Malaria Eradication Programme. The Court directed the Government to do so at the earliest, and also implement the action plan proposed by the Directorate of Health Services.

It was only after this judicial intervention that things began to improve. This is reflected in the tables and graphs accompanying—malaria deaths are now down to 'normal' once again.

The Malaria Research Centre, meanwhile, has continued its work to educate the people to deal with the environments that harbour the vectors. The MRC, for example, works with ACDIL to educate school children on how to keep their environments safe from mosquito-breeding sites. The MRC has also trained staff of the Goa Foundation, which also intends taking up monitoring of breeding sites.

However, the main problem remaining is not the mosquito but the repulsive Goan politician, or *mantri*. Public Health Officers who visit sites and fine developers found violating the provisions of the Public Health Act are called up and scolded by Ministers for being too harsh in levying fines. This has demoralised the staff considerably.

AUTO POLLUTION

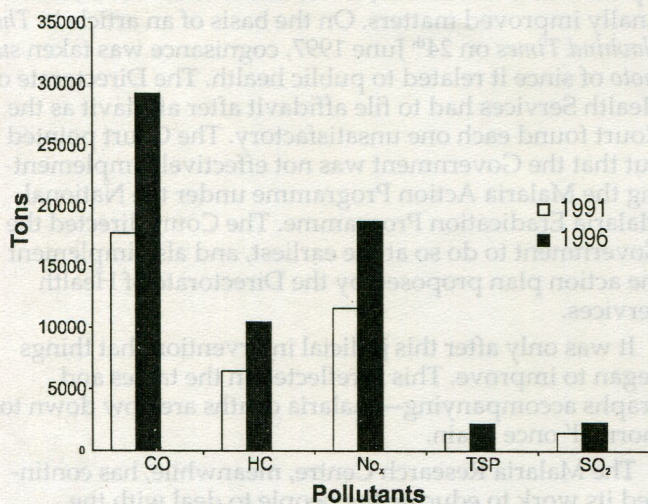
Of the three kinds of pollution which can damage the human body, air pollution is the worst in terms of the immediacy of its effects. This is because air pollution affects the human body through the lung route, where the exchange between the body and the pollutant is almost instantaneous. No greater demonstration of this is available than the Bhopal gas disaster in which thousands of people died.

In comparison, toxins and pollutants which are carried through the water and food routes take longer to be absorbed by the body. (Water is more readily absorbed than food which needs to be digested and can take several hours.)

Air pollution must therefore be taken seriously. With all urban areas within the country reeling under the onslaught of auto pollution, it is hardly likely that Goa would have escaped the scourge. Right enough, the air in places like Margao and Panjim is steadily becoming unbreathable.

There has been little systematic study of the problem of automobile pollution in Goa. There is no systematic air quality monitoring in Goan cities. An air monitoring system had been set up in Panjim, but has since been discontinued. But the in-built pollution monitoring equipment within the human body complains whenever exposed to a lungful of the air in Margao, Panjim, Vasco, Ponda and Mapusa.

Pollution load by pollutant in 1991 and 1996 (in tonnes)



Over the past ten years or so, there has been an exponential increase in the number of motorised vehicles on the roads, particularly two-wheelers. In 1996, there were 2,27,899 vehicles on the road; this is likely to be anywhere between 3 and 4 lakhs in 2001, which means that there is one vehicle on the road for every 3½ persons in Goa—woman, man and child! There has been a corresponding increase in burning of diesel and motor spirit. This is a figure that compares with India's big cities; the impact is not felt as much, except in Goa's cities, as the density of population for Goa as a whole is much lower than in an average metropolis or big city elsewhere in the country.

The maximum growth in number of vehicles has been largely in the two-wheeler category. But one cannot lay the blame entirely on this sector—any meaningful analysis of causes of pollution would have to take into account emission load per passenger capita kilometre travelled. Such an analysis would reveal that it is the owners of private cars who are major offenders. The Supreme Court's orders have not touched this sector at all; when such measures are extended to Goa, we are likely to have the same pattern repeated. While it is true that controlling public transport vehicles would have the greatest impact on reducing the overall pollution load, any method that targets only public transport is bound to be perceived as being inequitable.

So the large number of vehicles on the roads has led to an almost 60% rise in the quantity of pollutants emitted to atmosphere. The histogram indicates this difference between the years 1991 and 1996 in fairly dramatic fashion.

The very same causes that have allowed the menace of auto pollution to assume the proportions it has in India's urban environments are present in Goa as well: lack of a clear, equitable policy regime; haphazard urban planning; atrocious conditions of the roads; old, dilapidated vehicles; and, above all, a pathetic public transport system. To meaningfully tackle the problem of auto pollution would require an effort on a national scale. Public transport systems would have to be improved; fiscal disincentives like high taxes on private vehicles need to be imposed; the condition of roads needs to be improved; better quality, nonpolluting fuel is required; and the whole process of urban planning should be refurbished. This wish-list is unlikely to be fulfilled—what we are reduced to are piecemeal solutions like improving the quality or type of fuel used. Many of these solutions are inequitable, and being so perceived by the common man, have failed to elicit public support.

But some improvements can be made even at the Goa level, which would considerably improve the situation. Private bus operators have failed to deliver the goods, making public transportation such a nightmare that citizens are compelled to have their own vehicles.

In 1997, The Goa Foundation conducted a study of the state of auto-pollution control in Goa. The Government had come up with a regulation which required that after a period of one year from the date of registration, every vehicle would have to undergo a test for checking whether it meets the required pollution standards and shall carry a valid 'Pollution Under Control' certificate. 13 testing centres were set up in Goa. The scheme has been bedevilled by various implementation problems. Checking by the police has been tardy and there is thus no pressure on car owners to get their vehicles checked. Owners of the pollution testing machines (usually petrol pump operators) complain that they do not get sufficient vehicles coming to them for tests, so the whole scheme is uneconomic. For vehicle owners it has become a ritual—when the police are conducting checks, they get their vehicles checked. This means little, because it is easy to adjust the running of the vehicle so that it meets the norms. A number of centres even issue the certificate upon payment of the fee without bothering to check the vehicle. Under these circumstances, it is hardly a surprise that the scheme has become a farce.

Tailpiece: In Defence of the Pig

One of the characteristic features of Western civilisation is the desire to live in a 'sterile' atmosphere, free of all bacteria and germs. We have blindly aped this tendency, with little thought as to whether the traditional methods of maintaining hygiene and sanitation may not actually be more appropriate for our conditions. The imitative instinct, bred into us during the long years of imperial rule, has been helped along by the advent of mass tourism which leads us to convert our surroundings into what we believe the Western tourist would prefer. Unfortunately, the hygiene and cleanliness that results is often only cosmetic in nature, hiding the sordid reality beneath.

As part of this trend, over the last dozen years or so, an intrinsically lively feature of Goan life has begun to be banished out of existence—as an unwanted guest. This four legged, long snouted, tail-wagging outcast of Goan life unobtrusively inhabited the environment of the pig toilet, a traditional and essential appurtenance to every Goan house.

Upon entering his pig-loo every morning, a Goan's undigested rejects would land in a trench, where a pig roams acting as a mobile waste disposal unit. Each morning, the pig's distended belly bears mute testimony to toilets as clean as a whistle. From this early morning role of sanitary worker, he goes about his other jobs with a minimum of fuss!

Biodegradable stuff goes down the hatch after it is ferreted out by the pig's long snout, then he finds a pool of stagnant water heated by the sun and settles down for a nice jacuzzi. In the process of snoozing there, he kills the mosquito larvae and his digestive system puts out environmentally friendly fertiliser.

Modern development and mass tourism have brought in the European water closet. Sadly, this has turned the humble pig into an unwanted guest as western style toilets have replaced the pig loos. Pigs have traditionally been reared as scavengers in Goa, and though this system had certain disadvantages, it at least served to dispose of much of the waste. This waste now goes untreated through pipes into septic tanks where it creates unending problems or directly into the sea, where it ends up in the fish. Mosquitoes breed in the septic tanks.

The septic tanks and soak pits are often constructed without thought for the actual requirements. A brief tour around the overdeveloped tourist areas would show plenty of overflowing tanks and pits. These pollute the underground water sources. Traditional wells are becoming cesspools and local people are ending up at the hospital. Unheard of diseases are now becoming endemic, and drinking water must be boiled and filtered. The pig generated manure is now being replaced by chemical fertilisers.



Worse, the European water closet consumes large quantities of water—an unaffordable luxury for a parched country like ours where every drop of water is precious. Modern flushing systems, which require less water, are largely unheard of, and every time someone uses the loo now, gallons of precious water go literally down the drain. The most absurd part of this system is that it indiscriminately uses water that has actually been filtered, purified and chlorinated at great public cost! Neither the government nor the Municipal Councils is even thinking that for flushing waste, one does not need pure, chlorinated water.

Remember, what you see is not always what you get, and if you're faced with a squat loo, spare a thought for the poor unemployed piggies: squat smugly in the knowledge that your business will be taken care of in the greenest and gentlest of ways.

There are some other aspects of human life involving the humble pig that are simply unique to Goa, more particularly to its rural environment. Here we would like to introduce the practice of collecting the *dhond*.

The *dhond* is nothing but slop: combined waste rice water and other waste food including uncooked, unutilised scraps of vegetable wastes, all of which are dumped into a bucket and kept aside in every rural home. This slop is then collected and fed to domestic pigs. The amazing thing about the *dhond* is it really works.

Most households in average Goan villages maintain a waste bucket—usually tied around the trunk of a coconut tree) into which they chuck the food waste, particularly the discarded rice water, accumulated throughout the day. Early next morning, someone from the families rearing pigs will go over from house to house (actually, tree to

tree) collecting the slop and then feed it to the pigs.

Interestingly, the *dhond* is kept by both Hindu and Christian houses, though only the Christian houses rear pigs. The Hindus maintain the *dhond* even though they know the stuff goes to the pigs which they can never tolerate.

The pigs do cause a problem sometimes, particularly during the paddy growing months. They have a tendency to invade paddy fields and uproot freshly transplanted or young rice seedlings. This in turn provokes those owning the fields to poison them. The pigs eat the poison and die.

These small battles that go on in the village do get rid of a pig here and there, but by an large, the pig population continues to survive and provide its salutary function of an environment protection brigade; the *dhond* continues to be maintained and most important, the pig scavenges the village commons and cleans up stuff human beings discharge there, especially if they don't own any toilets, which is still a condition in several Goan houses.

The sulab shauchalaya people are trying to change this, by constructing a new brand of toilet (see the story on Sulab Shauchalayas) for those who need one.

But even if everyone were to own a toilet, we still hope the practice of the *dhond* continues, because it demonstrates that at the rural level, communalism is far more the exception than the rule. Hindus and Christians support each other's efforts to make a living, even when it is out of each other's wastes.



The responses of several sets of actors to the environment crisis facing Goa need to be carefully examined: Legislature, Government, Judiciary, and the civil society represented most vocally by Non-Governmental Organisations (NGOs). The Government enacts laws through the Assembly and then creates statutory bodies to implement them. There are several laws enacted to protect the environment. Some, like the Environment Protection Act, 1986, the Water Act, 1974, the Air Act, 1981, and the Forest Conservation Act, 1980, are Central Acts, but they do delegate powers to the State Government institutions to act. Others are simply local laws like the Goa Anti-Spitting and



Ecosystem renewal: For the first time in decades, newly hatched Olive Ridleys rush to the sea at Morgim, North Goa,

The Response to the Environment Crisis

Anti-Smoking Act; the Goa Non-Biodegradable Garbage (Control) Act; the Protection of Tourist Places Act, etc.

If these laws are seriously implemented, many of Goa's environmental problems would be mitigated. Most of the time, the implementing agencies are weak, indifferent, unwilling or simply corrupt, and collude instead with the offenders.

Judges of the Bombay High Court have been more zealous about implementing the environment laws than the executive and the legislature. For some time, the Goa bench was the greenest bench in the land. If the High Court had not intervened when it did, Goa would have been in a worse state than it is in today. But even the judiciary cannot be expected to work miracles if the executive is too far gone.

The NGOs have been probably the most vocal and the most effective institution of civil society to seek redressal of environment wrongs. If they had not existed and done their bit, it is doubtful whether the judiciary alone would have been able to intervene and cure some of the serious issues afflicting Goa's environment. The successful story of Du Pont's Nylon 6,6 project being driven out of Goa is known the world over. The cancellation of the Miramar beach privatisation plan is another in a long history of important victories associated with Goa's environment groups. Still, Goa needs more than double the number of citizen groups than it has today if civil society is to succeed in providing an effective and controlling voice in what happens to the Goa bioregion in the decades ahead.

ENVIRONMENT LAWS IN GOA

Forest Conservation Act, 1980 — The Forest (Conservation) Act, 1980, was enacted to provide for the conservation of forests. A Central Act, it applies to the whole of India except the State of Jammu and Kashmir. Section 2 of the Act (amended in 1988) provides that no State Government can make any order de-reserving a reserved forest or directing that any forest land may be used for any non-forest purpose or leased out to any private party or even cleared of trees for the purpose of any re-forestation or social forestry scheme without prior permission from the Central Government.

This important provision was introduced to ensure that State Governments do not succumb to local pressures to divert the forest heritage of the country and also to enable the Central Government to have a second look at any proposed scheme to cut down forests. The Central Government has a permanent committee under the Act to evaluate and consider whether permissions to kill a forest should be given.

However, taking advantage of the fact that in most state records lands are not accurately classified, private parties (especially large companies) sought to bypass the need for approval of the Central Government by seeking refuge in the fact that the land (where forest is sought to be cleared) was not classified as *forest* land. This, even when site visits showed the land as forested.

A landmark judgement of the Bombay High Court, Goa Bench delivered on November 27, 1990 by Justices

Ms Sujata Manohar and Dr. Eurico da Silva in Writ Petition 162 of 1987 (*Shivanand Salgaonkar v/s Tree Officer and Deputy Conservator of Forests*), put paid to such manoeuvres. The Court interpreted the Tree Act and the Forest (Conservation) Act liberally, to further the objects for which they are enacted, namely to prevent large-scale cutting of trees and denudation of forest land.

While admitting that there is no statutory definition of what constitutes 'forest' or 'forest land', the Court accepted the meaning of the word 'forest' as given in the Oxford English Dictionary, namely:

- i. an extensive tract of land covered with trees and undergrowth sometimes intermingled with pasture.
- ii. a woodland district.
- iii. a wild, uncultivated waste, wilderness.

This judgement is also important because it lays down that even if land is not classified as reserved forest or protected forest, for that matter even if it is not recorded as 'forest' in government records, if, on actual inspection it is found to be forest and other evidence indicates that it is indeed a forest, the land should be treated as forest for the purpose of applicability of the Forest (Conservation) Act. To quote from the judgement:

'The petitioner submits that the land in question is neither a reserved forest nor a protected forest. The area is also not recorded as "forest" in the government records. In the government records, the land is shown as "bharad" (barren) ... Admittedly the land in question is anything but barren. It has, according to the petitioner himself, a rubber plantation plus a large number of trees. The classification of this land as "bharad" in the Index Land Form 3 is, therefore, hardly accurate. A wrong description of land in Index Land Form 3 cannot prevent the application of the Forest (Conservation) Act, 1980, if it is otherwise applicable.'

The above judgement was successfully relied upon by two environment organisations, the Goa Foundation and Peaceful Society in a Writ Petition filed in February 1992 against the Chowgule Company to stop the destruction of forest land in Sanguem. The state had (in 1988) leased 12 hectares of forest in village Potrem, Sanguem taluka for the purpose of erecting a beneficiation plant to refine iron ore. The Chowgule Company had already illegally cleared two hectares and laid the foundation stone of the project when the two NGOs intervened.

The petitioners approached the Court to prohibit the Chowgule Company from further felling of trees on the plot and for directions to restore the land to its original use. Forests once destroyed, it was contended, cannot be replaced. The beneficiation plant could be relocated, the forest could not. The State had to consider as to what was more important, the last few green patches left in this country which are essential for the survival of the nation and its environment, or the saving of a few rupees of the mining company.

The Company claimed that its project was worth Rs 25 crores and if the beneficiation plant were not permitted to be erected, the company would suffer huge losses. The Company also produced approvals from the Ministry of Industry informing the company in 1991 that the Central Government was prepared to issue industrial licence for the establishment of the new undertaking. The Company claimed that this permission showed that the Central

Government had given its approval for the project, notwithstanding the fact that the area was forest.

The Deputy Conservator of Forests stated on affidavit that after site inspection, the Forest Department had found that the entire 12 hectares was covered by forest, there being on an average 250 trees per hectare and the plot was contiguous to government forest land. In other words, the 12 hectares had 3000 standing trees.

The High Court admitted the Petition and by interim order dated November 17, 1992, stayed any further development of the plot. The petition was finally heard in the year 2000 by a Division Bench comprising Justices F.I. Rebello and V.C. Daga.

During the hearings, it came to be known that the Ministry of Environment had on 9.11.1997 conveyed to the State Government its approval for diversion of 4.44 hectares of the forested land in favour of the Chowgule Company.

The Court on perusal of the facts and the submissions advanced by the parties held that:

1. Merely because the Ministry of Industries had agreed to issue an industrial licence to the Chowgule Company, that permission could not be construed as permission of the Central Government under the Forest Conservation Act.

2. The Court had no reason not to accept the opinion of the Deputy Conservator of Forests, who being personally conversant with the matter, stated that the entire 12 hectares was forest.

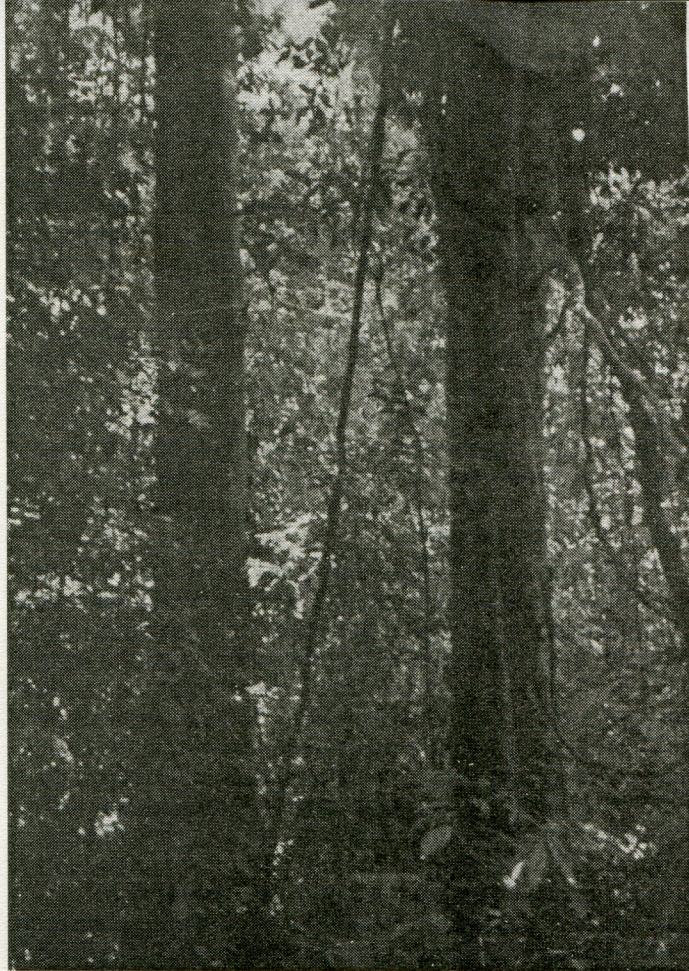
3. The subsequent decision of the Ministry of Environment to grant permission for diversion of 4.44 hectares could not help the Company since prior approval of the Ministry was required before the area could be diverted to non-forest use. Prior permission was not taken when the lease was executed in November 1989. Hence the lease itself was contrary to law and it was not even open for the State Government to apply at the behest of the Chowgule Company for subsequent permission to divert the land. The lease was held to be still born, null and void.

Before parting with the matter, the Court concluded as follows:

'Even otherwise the land is situated adjacent to Government forest and the land is sought to be used for setting up of a beneficiation plant which involves dust and water pollution and consequent destruction of the adjoining forest. It will substantially affect the environment and ecology of the area. This in fact would affect the right to life. The petitioners in the petition have averred that the cutting of trees without obtaining permission was resorted to. In matters of ecology and environment and considering the principle of sustainable development no person or organisation however high and mighty they may be can be permitted to flout the law of the land.'

The SLP filed by the Company against the judgement has been admitted by the Supreme Court and is pending hearing.

The application of the forest act to forest land in Betim was also the subject of controversy in a writ petition filed by Goa Foundation and Nirmal Vishwa against Tata Housing Development Company (THDC). In this case the two NGOs challenged the construction of an elite housing



Forests conserve water, hence it is foolish to destroy them for industry

colony on the hill slopes of Penha da Franca village, Bardez Taluka in forest area popularly known as Betim forest. The petitioners' case was that the area was forest and non-forest activity was not permissible therein unless prior permission was taken from the Central Government under the Forest Conservation Act, 1980.

THDC had applied for permission to fell the trees on the plot under the Trees Act. The Deputy Conservator of Forests (Tree Officer) had refused to grant permission to fell the trees. The Range Forest Officer had recorded during inspection that the Forest Conservation Act applied. However, the Conservator of Forests, who is the appellate authority under the Trees Act, granted permission on 9.1.1997 to fell 32 trees. Thereafter, THDC carried out large-scale felling of trees which raised a public uproar (petitioners estimated the felling at around 200 trees), forcing intervention by the Government who directed THDC to stop the ongoing activity till the matter was reexamined.

The permissions for construction granted to THDC had included a condition that the natural cover/landscape formed by trees as seen from the River Mandovi should not be disturbed in any fashion while carrying out the development/construction. The large-scale felling of trees had totally violated this condition. Despite this, after making minor modifications in the building plans, the construction was allowed to resume.

It was at this point in time, in August 1997 that the development was challenged in public interest by the NGOs. The Court admitted the writ petition but did not stay the project. However it made it clear to THDC that the project was subject to the final decision in the petition.

Fortunately, at that very time, there was in existence a high level committee—the Sawant Committee—which had been appointed by the State Government to identify forest lands in Goa pursuant to directions from the Supreme Court to States all over India in the *Godavarman Thirumulkpad* case.

The High Court therefore decided to direct the Sawant Committee to examine the matter and to take a decision on whether the land on which the Tata project was approved was to be classified as forest or not in the light of the interpretation of the expression 'forest' as spelt out by the Apex Court.

The Sawant Committee, after site examination and consideration of all material, recorded in its report dated April 1998 the following conclusion: 'On the basis of observations and scientific data collected, analysed and interpreted, the Committee unanimously came to the conclusion that the said plot under reference (Sy.No.69/4) was forest.'

THDC challenged the Sawant Committee Report on various grounds including *mala fides*. It claimed that the Committee had not followed the required criteria to decide whether the area was forest. The High Court, however, held that once the Expert Committee classified the land as forest, the consequences must follow: prior permission from the Ministry of Environment & Forests was a prerequisite for diverting the plot to non-forest use.

The Court also observed in its judgement that the State Government had only superficially examined the project when granting permissions, and that the Planning Authority did not bother to go into the true nature of the land despite earlier observations of the High Court in the *Salgaocar* case that the classification in the Land Records was not always accurate and indicative of the present nature of land.

The plea of the THDC that it had already spent Rs 5.5 crores on the project was of no avail as the Court held that the project would be an eyesore in the green belt of the hillock towards the River Mandovi. The Court quashed all permissions granted to the housing project, directed removal of all development work and restoration of the hill to its original vegetation.

THDC appealed the High Court judgement. The Supreme Court, after hearing the SLP, has directed that since the question involves forest and the decision of a Committee appointed by the Supreme Court, it will be taken up by the Bench hearing the *Godavarman* matter. All construction activity on the plot has been stopped since the High Court judgement delivered on 16th October 1998.

The Goa, Daman & Diu Preservation of Trees Act, 1984 — Besides the famed beaches of Goa, what is bound to strike any visitor to this tiny territory, is the greenery throughout the countryside, from little back and front yard gardens to the dense forests of the hills and the ghats. Yes, Goa is essentially a green cover area. Over 70 per cent of the land is under tree cover of some kind. If one estimates roughly half of this area to be natural forests, then it means that the other half has been planted by people. This latter portion exists in the form of coconut and cashew plantations as well as indigenous trees (fruit and timber), which have been planted by people over generations. What this testifies to is that people in Goa have a tree planting culture unrelated to any laws on the subject.

The Preservation of Trees Act came into force on 23rd August 1984. The rationale for this Act was the existence of private forests in the State which the government claimed it wished to preserve. Felling forests in private lands was then done with the permission of the Forest Department and Collector under the Goa, Daman and Diu Forest Rules, 1964, as well as the Land Revenue Code, 1968, but there was nothing in these Rules/Code to refuse such permission even when it was felt that such felling of trees will be against the larger interest of the territory. Hence the Tree Authority set up under the Act was given the duties of protection of existing trees and the growth of more.

There are two Tree Officers—one for North Goa, with his office at Ponda and the other for South Goa with an office at Margao. The powers given to the Tree Officers are wide and include powers to seize property, release property under execution of bond by the owner, power to arrest without warrant, powers to release persons arrested, powers to prevent commission of offence and power to compound offences.

An elaborate procedure is set out for felling even a single tree growing in one's backyard.

If the tree poses a grave danger to life or property one can have it felled *immediately* and report the fact to the Tree Officer within 24 hours of such felling. If there is no urgency, then one applies for permission. The Tree Officer must give his decision in writing within 60 days from the receipt of the application, if not the permission is deemed to have been granted. Permission may not be refused if the tree is dead, diseased, constitutes a danger to life or property, or is required for the bona fide use of the owner.

If the felled tree is disposed off on site (e.g. cut for firewood) the matter ends here. However if the tree needs to be taken to a saw mill a fresh round of permissions is required.

What if tree felling is done illegally? How much more difficult and expensive would it be? Not much more, it appears. Since the chances of being caught are not high, vehicle owners and even saw mills are willing to entertain logs transported without permission (but at a higher price naturally).

Has the Act controlled destructive felling? It has certainly made felling more difficult, but felling continues nevertheless since the authorities continue to issue permissions for felling sometimes hundreds of trees for new development projects, even when it concerns vulnerable eco-fragile areas. Moreover the procedures for felling a single tree and for felling a hundred trees are the same. Consequently, the individual waiting to fell one tree and the person wanting to fell a large number have to spend practically the same amount of time and energy in the process. The person with just one tree to cut thus feels harassed; the person who wishes to fell a number of trees is at an advantage. Invariably the latter category will be government departments and large companies who also have infrastructure to handle such procedures. The Trees Act has thus bred ill will among the very people who have for centuries nurtured and supported the culture of growing trees without Government interference.

The Trees Act has also become redundant as regards protection of private forests since the Courts have interpreted the Forest Act to cover all forests irrespective of

ownership. Hence the Trees Act should be substantially modified in order to (a) simplify procedures so that an applicant who wants to fell a small or minimum number of trees (say five or less) does not feel harassed, and, (b) it should be made difficult, in fact impossible for felling of trees in large numbers.

The Environment (Protection) Act, 1986 — This landmark piece of legislation—which can be invoked to deal with any and all forms of environmental violations—was enacted in 1986 to provide for the protection and improvement of the environment.

The prologue reflects the growing worldwide concern with the increasing degradation of the environment and records that this Act is consequent to 'the UN Conference on Human Environment held at Stockholm in June 1972 in which India had participated.'

Environment is defined very widely under the Act and 'includes water, air and land and the interrelationship which exists among and between water, air and land, human beings, other living creatures, plants, microorganism and property.' The Act is applicable to the whole of India and overrides other legislation including local laws.

Section 5 is the crux of the Act: it grants the government power to close down any industry (or hotel) or stop the supply of electricity or water to it in case it is found to be violating the provisions of the Act. Consequent to this Act, standards for emission or discharge of environmental pollutants have been laid down, procedure and safeguards for prevention of accidents have been adopted, state laboratories for collection of and analysing samples have been notified and certain State Governments have been delegated powers to issue directions under section 5 of the Act. Delegation of powers to Goa State under section 5 was made on September 22, 1988.

Introduced for the first time into the Environment (Protection) Act and later incorporated also into the Air (Prevention and Control of Pollution) Act, 1981, and Water (Prevention and Control of Pollution) Act, 1974, is clause 19, which permits any individual to file legal proceedings against any party for an offence committed under the Environment (Protection) Act provided, notice of 60 days is given to the authority appointed under the Act. The notice and complaint must be in the prescribed manner and format: both are given in the Act.

Laboratories appointed in Goa under the Environment (Protection) Act, to analyse samples of air and water pollution under section 12 of the Act are:

1. Environmental and Pollution Control Wing
Directorate of Health Service, Bambolim, Santa Cruz
P.O., Goa.
2. Chief Inspector of Factories and Boilers,
Safety Training Centre, Altinho Panjim, Goa.
3. National Institute of Oceanography, Dona Paula, Goa.

For a complaint under section 19 of the Environment (Protection) Act, notice (to be sent registered post A.D.) must be given on Form IV (copies available with Goa Foundation) to:

1. The Goa State Pollution Control Board,
Patto Bridge, Panjim, Goa.
2. The Chief Secretary,
Government of Goa, Panjim, Goa.

3. The Ministry of Environment and Forests,
Paryavaran Bhawan, CGO Complex, Lodi Road, New
Delhi.

The EPA has been applied on several occasions in Goa to deal with environment violations committed by the hotel industry. Directions under Section 5 were issued by the Ministry of Environment to the Goa State Electricity Board to disconnect the supply of electricity to several hotels, until they demolished the constructions which had been undertaken in contravention of the conditions of environmental clearance imposed on them while granting them permissions to construct. The hotels, without exception, challenged Section 5 and the applicability of the Environment Protection Act to the hotel industry. In all cases the High Court admitted the hoteliers' petitions and stayed the directions.

These directions were largely issued during the years 1988 to 1991, i.e. before the CRZ Notification—the new statute to protect the coastal areas—came into force. The writ petitions finally came to be heard only in the year 2000. (It was not in the interests of the hoteliers to press for early hearings of the petitions as the directions had merely been stayed and neither the hotel constructions or their functioning were restricted in any manner.) Unfortunately, the Ministry of Environment also did not press for early hearings of any of the matters.

The petitions were heard by a Division Bench comprising Justices F.I. Rebello and V.C. Daga who passed a detailed judgement upholding the applicability of the EPA to the hotel industry including the directions issued under Section 5 to the hotels to demolish the offending constructions.

The Court held that:

1. The right to life (Article 21) includes the prevention of degradation to the coastal ecosystem since tampering with the ecosystem has resulted in environmental disasters to significant species of animal life, including humans. The right to a clean environment, fresh air and unpolluted water having been recognised by the Apex Court in various judgements as a part of the right to life, it was held that enactment of law is not necessary to make Article 21 meaningful. Article 21 itself is a repository of a citizen's right to life. Environmental restrictions imposed on hotels in order to protect the coastal ecology form a part of the right to life guaranteed to all citizens under Article 21. Even in the absence of municipal law, courts can give effect to the policy decisions of the government taken in furtherance of India's international commitments to protect the ecology.

2. The Court negated the contention that beach resorts are not covered by the Environment Protection Act and held that the expression 'measures' under Section 3(2) of the EPA read with Section 3 (2) (v) imposing restriction in areas for setting up industries, operations or processes does not necessarily deal with environmental pollution only. Section 3 enables the Government to take any and all steps that may be necessary to protect the environment and control environmental pollution.

3. The Court also negated the challenge to Section 5 and held that it does not suffer from the vice of arbitrariness nor is it *ultra vires*.

4. Finally, the Court held that guidelines issued to restrict activities in the coastal areas would not have the

effect of depriving any developer of his right to property since the owners are not deprived of possession of the land nor is ownership of the land transferred without authority of law. The owners have the right to use their land for permissible activities and have merely been restricted from using the land for building activities.

The Court concluded by stating that 'Though we have examined the conduct of the hotel to find out whether there are equitable considerations, in our view, in matters affecting ecology and environment and when Article 21 is attracted, there can be no equitable considerations.'

The judgement is under the consideration of the Supreme Court as the resort owners' appeal has been admitted and the Apex Court has directed status quo.

The Water (Prevention and Control of Pollution) Act, 1974 — This is a Central Act applicable to all states which have adopted the Act by resolution. The Act is applicable to Goa. The Act was amended in 1978 and thereafter in 1988. Rules under the Act were notified by the Government of Goa on September 23, 1988, i.e. more than 14 years after the Act was notified. The Rules include all the relevant forms for getting permissions under the Act and other matters including reports of laboratories. For appeals against orders passed by the Board under the Act, the Government of Goa has appointed the Minister for Environment as the appellate authority. The Appeal Rules have been notified on April 13, 1989.

The National Institute of Oceanography (NIO), Dona Paula, has been notified as the State Water Laboratory (SWL) under section 52 of the Act. NIO scientists have been appointed as government analysts at the laboratory for the purposes of the Act.

The Environment and Pollution Control Wing, Directorate of Health Services, Bambolim, Santa Cruz, has been notified as the Board Water Laboratory (BWL) under section 17 of the Act.

In case of any dispute between the BWL and the SWL, the SWL is the reference Laboratory and the results of its tests will prevail.

The Air (Prevention and Control of Pollution) Act 1981 — This Central Act is applicable to the whole of India since 16-5-1981. The Act was amended in 1987. Under section 19 of the Act the State Government has notified the whole of Goa as an air pollution control area by a notification No.14-1-88 of January 2, 1992. The Act empowers the State Pollution Control Board (SPCB) to take all measures for prevention and control of all types of air pollution. The standards or consent limits for discharge of air pollutants are to be maintained in a register which is open to scrutiny by members of the public.

Rules under the Act for the State of Goa were notified only on April 10, 1989, i.e. nearly eight years after the Act was notified. The Rules provide the relevant forms for applying for consent for emission of pollutants under the Act and the forms for the reports of the Board analysts and the government analysts respectively.

The following steps are still to be taken by the SPCB/ State Government under the Act: The Board Air Laboratory and the State Air Laboratory are yet to be notified, so also the rules under which these laboratories will function. The form for filing of complaints under section 43 B

is also not notified. These are extremely serious omissions and severely cripple the effectiveness of the Act.

Under the Air Act, two Air Laboratories have to be set up. One is the Board Laboratory under section 17 of the Act and the other is the State Air laboratory under section 20 A. The Board Air Laboratory is the Environment and Pollution Control Wing, Directorate of Health Services, Bambolim, Santa Cruz P.O. Goa.

The State Air Laboratory is the Public Health Institute, Government of Karnataka, Seshadri Rd, Bangalore 560 009.

In case of any dispute the State Air Laboratory is the reference Laboratory and its tests will prevail.

The Goa Daman and Diu Wild Animals and Wild Birds Protection Act, 1965; The Wild Life Protection Act, 1972

— The above two comprehensive pieces of legislation (and rules thereunder), the former by the Goa Government, the latter a central government legislation, regulate the activities connected with wildlife in the State of Goa.

The Acts impose restrictions on hunting activities, regulate licences and trade and commerce in wild animals, and seek to establish sanctuaries, national parks, game reserves and closed areas where wildlife can be protected and propagated in its natural environment. In Goa, wildlife sanctuaries are established at Bondla, Molem, Cotigao, and Chorao.

The Public Liability Insurance Act, 1991 — The Public Liability Insurance Act (PLI) Act came into effect on April 1, 1991. It has been enacted for the specific purpose of providing immediate monetary relief to persons affected by accidents that occur during the handling (including transport) of hazardous substances.

A very important feature of the PLI Act is that in any claim for relief, the victim does not have to prove that the death or injury or damage caused occurred due to someone's fault or neglect. It is sufficient to establish only (a) that the accident took place, and, (b) that the claimant has suffered damage to person or property because of it.

To establish this, potential victims should bear in mind that, wherever possible, it is essential to produce documentary evidence with their claims.

Documents which should be annexed in support of one's claim include:

- a. Death Certificate
- b. Medical Certificate regarding disability or injury or illness; proof of hospitalisation.
- c. Medical prescriptions, bills or receipts.
- d. Certificate from employer in case of loss of wages; in case of self-employment signed statement concerning loss of wages.
- e. Certificate of cost of repairs or replacement of private property damaged by the accident.

Applications are to be made on the prescribed form within 5 years of the occurrence of the accident.

The following are the amounts permissible under the PLI Act.

- i. Medical expenses to be reimbursed upto a maximum of Rs 12,500.
- ii. For death or total permanent disability, relief upto Rs 25,000.

iii. For damage to property, relief upto Rs 6,000

A person claiming compensation under PLI Act is not debarred from filing a suit for full compensation for damages caused.

The PLI Act was applied for the first time in Goa in 1992 after a tanker carrying chlorine gas cylinders met with an accident at Chinchinim and discharged chlorine into the atmosphere. The chlorine caused damage to the residents and to the environment. The Collector invited applications for compensation under the Act and 38 people responded with claims. After hearing the victims and the companies involved in the incident, the Collector awarded full compensation of Rs 38,927 as per the claims of the victims.

The Collector held all three companies who were connected with the consignment as equally responsible to pay the compensation to the people.

The welcome feature of PLI Act is that it relies upon uncomplicated procedure, making it possible for victims to handle their own cases instead of relying upon lawyers. It also sets a limit of three months for determination of relief. No appeal is allowed under the Act.

The Goa Tourist Places (Protection and Maintenance) Act, 2001 — This Act was passed by the Goa Assembly after all efforts of the Government to get Salgaoncar Mining Industries to remove its wasted ship grounded off the Candolim coast failed, threatening an environmental disaster. The presence of the ship and the periodic releases of oil have diminished the prospects of tourism for this entire belt.

The Act empowers the competent authority notified under it to take steps to take over the 'nuisance' (in this case, the ship) and then bill the owner or person responsible for causing the 'nuisance' in the first place.

Though the Act was passed unanimously in 2001, the ship is still there, testimony to the ineffectiveness of government. However, citizens can use the various clauses provided in the Act to remove any 'nuisances' they encounter in the notified tourist areas.

Note: The various legal articles in this section were specially written for Fish Curry and Rice by Adv. Norma Alvares.

THE CRZ NOTIFICATION

It might come as a surprise to many to know that the coastal zone (i.e. the land which extends from the beginning of the coastal plain to the beginning of the continental shelf) occupies only 8% of the earth's surface area but is home to nearly half of the world's population, and these numbers are ever on the increase. It is not only the powerful scenic beauty that this eco-region has to offer which drives people to crowd in those narrow sandy ribbons outlining the world's continents, where land meets the sea. Consider the following:

The coastal zone hosts 26% of the earth's primary plant productivity, the world's major spawning and nursery grounds and one of the earth's most diverse ecosystems—the coral reefs. The world's primary fishing grounds are located in these fertile coastal waters, as well as some of the most fertile agricultural land which lies in the coastal belt. Farming and fishing, the two major coastal industries, provide employment to hundreds of millions of people worldwide. And there are several other ways of making a living—international trade and tourism, to name a few among the recent entrants.

Each year hundreds of people migrate from the hinterlands to the coastal areas in search of a livelihood and in the hope of finding employment, if not utilising the agricultural skills they are familiar with, at least in the areas of fishing or as unskilled labour in the several industries that dot the coastline.

This single factor alone should give one an idea of the demands that such a concentration of humankind is bound to exert on the natural resources that this region has to offer. Moreover such a concentration of development activities threatens to destabilize the very resources that provide the possibilities of living in the coastal belt.

The result of increased economic activities in the region over the past three to four decades has seen the depletion of marine life due to overfishing in coastal waters, the levelling of sand dunes (nature's first line of defence to protect the hinterland from the ravages of the ocean) to make way for hotels, golf courses, and various forms of sports activities, the destruction of hundreds of acres of mangrove forests and coral reefs and the ingress of saline water into fresh water aquifers. In addition, pollutants and toxins galore are emptied daily into the coastal waters as governments find it a cheap and easy way to get rid of town and industrial wastes.

It is with this background that one needs to view the steps that have been taken by the Central Government to arrest the violence being unleashed against nature on the coastal areas, which, if allowed to continue unhindered, could cause irreversible damage to this fertile productive territory.

It was in the early seventies just after the time of the Stockholm Conference that India first initiated specific legislation to protect its environment. A major step in the direction of protecting its coastal regions was taken when the then Prime Minister, Mrs. Indira Gandhi, addressed a brief letter to the Chief Ministers of all the coastal states on 27th November 1981 directing them to ensure that the coastal zone up to 500 m from the High Tide Line (HTL) was kept free from development activities of all kinds. Her intentions appear to have been as much to preserve

the aesthetic beautify of the region as to conserve its ecological assets.

The Prime Minister's letter which reflected the policy of the government was widely respected and obeyed more or less in its entirety, as long as Mrs. Gandhi lived. It was undoubtedly a major factor that helped to protect the coastal areas from unplanned and unwarranted development including industries and tourism complexes.

But this protection did not last for long. The pressures—particularly from the tourism lobby—to open up the coastal areas to international tourism resulted in the Central Government taking an official decision in 1986 to relax the ban on construction in the 500 m coastal zone and to permit the setting up of tourism resorts within 200 to 500 metres of the HTL subject to environment conditions imposed on the project.

As it turned out the environment conditions were rarely adhered to and the hotels constantly kept putting pressure on the government to modify the directions issued to them, which the government usually succumbed to, since the luxury resorts invariably presented the Government with a *fait accompli*.

It was partly to circumvent this kind of pressure as well as to standardise the regulations, so that they would be uniformly applicable all over the country, that the government decided to write the coastal environment guidelines into the statute books. Thus, on 19th February, 1991, a notification was issued by the Ministry of Environment and Forests under Section 3(1) and 3(2) of the Environment Protection Act, 1986, and Rule 5 (3) (d) of the Environment Protection Rules, 1986, to accord special protection to the coastal areas of this country. This legislation is referred to as the Coastal Regulation Zone (CRZ) Notification and it is one of the most important pieces of legislation for protection of the coastal areas.

By this law, the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (on the landward side) upto 500 m from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and the HTL were identified as the Coastal Regulation Zone (CRZ). Areas identified as CRZ would receive special protection. The notification imposed several restrictions on the setting up and expansion of industrial operations and processes in these areas.

Among the activities that are prohibited outright in CRZ areas are: setting up of new industries and expansion of existing ones; manufacture, handling, storage or disposal of hazardous substances; discharge of untreated waste and effluents from industries, cities, towns and other human settlements; land reclamation, bunding or disturbing the natural course of sea water; mining of sand, rocks and other substrata minerals; drawing of groundwater, using mechanical means; dressing or altering of sand dunes, hills and other natural features including landscape changes, for beautification, recreation, etc.

All activities other than those expressly prohibited would be regulated in the CRZ and would require the prior approval of the Government of India (especially if the investment exceeds five crores of rupees).

For purposes of proper management of the coastal areas, the CRZ Notification classified the area into zones

depending on the intensity of protection that these areas required.

CRZ-I: Comprises those areas that are most fragile and consequently in need of absolute protection from all form of development. It comprises areas which are ecologically sensitive and vulnerable including mangroves, sand dunes, coral reefs, sanctuaries, spawning grounds of fish, heritage areas, areas likely to be inundated due to global warming and the foreshore (beach) area which lies between LTL and HTL.

In this zone, for obvious reasons, no new constructions are permitted and the area is generally treated as a no-development zone.

CRZ-II: Comprises areas that have already been developed upto or close to the shore line. All cities and other well populated areas which are substantially built up and have roads and other infrastructural facilities such as water supply and sewerage mains would fall into this zone.

In these areas development is permitted only on the landward side of the existing buildings or roads—the general idea being that since it is not economically and politically feasible to reverse the development that has already taken place, the least one can do is to prevent further damage by restricting activity to areas behind those that have already been developed.

CRZ-III: The areas that are relatively undisturbed and which do not fall in CRZ-I or CRZ-II. In this zone, the area upto 200 m from the HTL is a No Development Zone except for repairs of existing authorised structures and other permitted activities like gardens, parks etc.

Within 200 to 500 metres the CRZ Notification specifically permits the traditional inhabitants of the coastal areas (the fisher folk and farmers) to construct new or reconstruct old dwellings. However, to ensure that construction activity is controlled even while catering to the needs of the local inhabitants, the CRZ Notification specifies that the total number of dwelling units so permitted in this area may not exceed twice the existing number of units. Also, only persons belonging to the village community 'the *gaathan*' and who thus have traditional rights in the coastal village are permitted to build new residential constructions. Thus while the CRZ Notification allows for the natural expansion of the families of the local inhabitants, it actively discourages outsiders from construction activity in these undisturbed coastal areas.

Between 200 m-500 m a concession has also been made for the foreign exchange earning potential of the tourism industry and therefore hotels for tourism purposes are permitted, subject to conditions including restrictions on height of building, number of floors, FSI etc.

Recognizing that the beach areas are an important area of economic activity for the coastal people like fisher folk and also recognizing that beach areas form a valued recreational area for the vast majority of common folk, the Government also gave much weightage to the question of access of the public to the beach. The law therefore stipulates that 'to allow public access to the beach at least a gap of 20 m width shall be provided between any two hotels/beach resorts and in no case shall gaps be less than 500 m apart.

This demarcation of areas into zones as defined in the Notification is to be indicated on the Coastal Zone Management Plan (CZMP) which each coastal state was to prepare and get the approved by the Central Ministry of Environment within a year. The fact that not one single coastal state had an approved CZMP even 5 years after the Notification had come into effect speaks much for the interest that the state and central governments had in the implementation of the Notification.

It was in this context that the Supreme Court took cognizance of the situation in a Writ Petition filed before it by the Indian Council for Enviro-legal Action and condemned the deliberate apathy, indifference and active sabotage of the CRZ Notification by the government in a strongly worded judgement dated 18th April 1996.

The Goa CZMP, like that of several other states, was finally approved on 29th September 1996. Development in the CRZ areas can only be in accordance with the CZMP. The states are also duty bound to give wide publicity to the coastal management plans. Two High Courts (Kerala and Mumbai-Goa Bench) have passed directions in regard to making the CZMPs available to the citizens.

The CRZ Notification has been amended from time to time.

By Order dated 26-11-98 the Ministry of Environment has constituted a National Coastal Zone Management Authority (NCZMA) for the purpose of ensuring implementation of the CRZ Notification. It has also set up State Coastal Zone Management Authorities for each of the coastal states. The terms of the NCZMA and the State CZMAs are to advise the Ministry on the protection of

the coastal areas, to enquire into complaints regarding violations of the Notification and to examine proposals for changes or modifications in the CZMPs.

The CRZ Notification has come full circle. From tentative beginnings way back in 1981, it has been formulated into law that has been tested at the highest legal forum, and the Apex court has reaffirmed the need to actively implement the Notification in all aspects.

It is not as if the CRZ Notification is the perfect law, ideal to protect the coastal areas. Far from it. The CRZ law is essentially defensive in its structure and scope and even if fully implemented in letter and spirit, could at best prevent further degradation of the coastal areas. It contains no provisions for rehabilitating the coastal region. It enjoins neither the government nor the people who inhabit and use the resources of the coastal region to take any steps to rehabilitate the territory for example by making it mandatory either to shore up the sand dunes already ravaged or to repair the damage done to freshwater aquifers.

In the ultimate analysis, unless the life-style that we lead and the laws that govern us are nature-sustaining and rejuvenating, giving an opportunity for nature to not merely exist but to flourish and to prosper, our laws and regulations cannot be worthy of being handed down to future generations to emulate. However, the CRZ Notification is a significant effort simply because it gives us a reprieve from the pressures of uncontrolled development and time to think of what should be done to revive nature—already considerably ravaged—in the days ahead.

The Goa Public Health Act

The Goa Public Health Act was passed by the Goa Assembly in 1985. It deals with most of the important issues connected with the protection of public health. It remains, however, poorly implemented. One recent reason for this was disclosed by health officers appointed under the Act: political interference. Ministers have been found to tick off health officers who have done their duty and levied fines against builders.

The Act provides for the constitution of a Public Health Board which must have in its composition three persons having special knowledge of matters relating to public health or public health engineering. Both the Government and the Collector have been given overall, supervisory powers for implementing the provisions of the Act. A Health Officer must be appointed for each area in the State. This Officer is the main agent for implementing the provisions of the Act at the field level.

Water supply — The Act requires that where the local authority supplies water, this must be throughout the year and must at all times be wholesome and fit for human consumption. Government may direct local bodies to work out schemes of water supply. The Collector has been given powers to inspect whether any source of water supply is contaminated and to take

effective measures to protect such supplies. Even the railway administration is duty bound to submit samples of drinking water for analysis (which it never does). The Government has in addition the power to take steps to protect and periodically examine water sources in the State (which is also rarely done, if at all). The Health Officer has ample powers to check that water supplies are not contaminated by any source and to clear out contaminated areas.

Drainage — The local authorities are in charge of maintaining public drains under the Act. However, few of them do, and everywhere in the State the public drains are now treated as garbage and sewage collection points, dumping grounds for building debris, septic tanks and the like. The Act requires that no person shall construct any building, house, cess pool or any other structure without prior permission from the Health Officer. The Act specifically prohibits any person from polluting water in any way.

Sanitary Convenience — The local authority has an obligation under the Act to provide for public sanitary conveniences. It also lays down the conditions for construction of latrines.

Nuisance — Under the chapter on abatement of nuisance (which is defined quite widely in the Act to include vibration and noise), both local

authorities and Health Officers are empowered to stop such nuisance if a complaint is filed. But do they? Almost never. The chapter on nuisance abatement in fact is as effective as Section 133 of the Criminal Procedure Code. Maybe citizens should test out these provisions since we believe they have rarely been resorted to.

The most important recent amendments to the Act involve mosquito control measures. The Act sternly prohibits careless collections of stagnant water in which mosquitoes are likely to breed. It requires that builders will see that their construction labour have health cards and are free from malaria. Builders are required to take anti-larval measures. Owners of buildings can be told by the Health Officer to treat mosquito breeding sites or face the music.

Get a copy of the Act for Rs 110 from the Government Printing Press and use it to protect your environment from activities that will have an impact on your health and those of your neighbours. Give Health Officers some useful work to do.

Goa State Coastal Zone Management Plan

NO.J-17011/12/92-IA-III

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT & FORESTS
IA DIVISIONParyavaran Bhavan,
C.G.O. Complex,
Lodi Road,
New Delhi 110 003.

September 27, 1996.

To,

Chief Secretary,
Government of Goa, Panjim.*Subject : Coastal Zone Management Plan (CZMP)
of Goa*

The Coastal Zone Management Plan of Goa submitted vide letter No.31/7/TCP/96/221 dated 26-6-96 has been examined.

2. I am directed to convey its approval in accordance with the powers vested in Central Government under Section 3 (3) (i) of CRZ Notification, 1991 subject to incorporating the following conditions and modifications.

A. General Conditions

i. All the relevant provisions of the Coastal Regulation Zone (CRZ) Notification, 1991 as amended in 1994, (after incorporating the directions given by the Hon'ble Supreme Court vide its judgement dated 18.4.1996) shall be strictly incorporated in the CZMP.

ii. No activity that has been declared as prohibited under Section 2 of CRZ Notification, 1991 shall be carried out within the Coastal Regulation Zone.

iii. The permissible activities shall be regulated in accordance with Section 3 and follow the norms for regulation as indicated in Section 6 (2) of CRZ Notification, 1991 as amended in 1994.

iv. The classification of Coastal Regulation Zone shall be in accordance with Annexure-I, Section 6 (1). For development of Beach Resorts/Hotels in the designated areas of CRZ-III, the guidelines indicated under Annexure-II shall be followed.

v. In addition to the information already available with the State Government of Goa, all ecologically important and sensitive areas shall be demarcated on the basis of the following sources of information:-

a. National Parks, Sanctuaries and Marine Parks — Information published/available with Ministry of Environment & Forests (MOEF), Government of India (Gol).

b. All reserve forests and protected Forests — As marked in the Forest Atlas updated through Biennial Forest Report Status published by Forest Survey of India (scale 1:50,000).

c. Mangroves, Mudflats, Coral reefs/Corals — Maps prepared on the basis of Satellite Imagery in the scale of 1 : 25,000 by Space Application Centre, Ahmedabad and the information as published by MOEF, Gol.

d. Breeding grounds for turtles, horse shoe crabs — Wildlife Institute, Dehradun.

e. Historical and Heritage sites — As listed with Archaeological Survey of India, State Departments of Archaeology, Culture and Tourism in addition to the sites, if any, mentioned under specific conditions of this letter.

f. Areas rich in genetic diversity — Information published/available with the MOEF, Gol.

g. Areas of outstanding natural beauty — Government of Goa to decide keeping in view the generally recognised perception regarding such areas.

h. Sea level rise due to global warming — National Institute of Oceanography.

In case the requisite information is not available from the sources mentioned above, information obtained from other sources may be used after approval of MOEF.

vi. On the basis of further studies or in the event of any additional such information brought to the notice of State Government/Central Government all areas that are ecologically sensitive and important (as per CRZ Notification) shall be classified as CRZ-I by the UT Administration with the prior approval of MOEF.

vii. The State Governments which have prepared maps on 1:25,000 scale through Satellite Imagery for the purpose of delineating the HTL, should submit these maps to the Chief Hydrographer, Government of India for the purpose of demarcation. Those State Governments which were not in a position to prepare the maps in this manner, should submit them to the Chief Hydrographer, Government of India for the purpose of vetting. It is advisable that whenever there is any doubt, any development activity should only be permitted after ground measurements from the HTL taking into consideration marks left by water, presence of mangroves, mudflats and beach.

viii. State Government of Goa shall delineate on the maps LTL, HTL, 200 metres, 500 metres lines and other relevant lines in respect of creeks, backwaters and rivers affected by tidal action so that distances can be measured, whenever required.

ix. All uninhabited islands are being classified as CRZ-I (subject to continuation of existing traditional rights, social rights and customary uses) except those islands which have been approved by MOEF, Gol as CRZ-III or CRZ-IV. In case of uninhabited islands classified as CRZ-I, in exceptional cases should a carrying Capacity Study establish that the proposed development will not have adverse ecological impacts, those particular islands could be reclassified as CRZ-IV, subject to prior approval of MOEF, Gol.

x. Government of Goa shall ensure that all development and activities in CRZ areas take place within the framework of the approved Coastal Zone Management Plan. Violation shall be subject to the provisions of Environmental (Protection)

Act, 1986 and other relevant laws.

xi. Government of Goa or any other Authority so designated shall be responsible for monitoring and enforcement of the provisions of CRZ Notifications and CZMP.

xii. Approval of this CZMP would not imply approval of any proposed project such as roads, airports, jetties, ports and harbours, buildings etc., indicated in the plan/map.

xiii. All mangroves with an area of 1000 square metres or more would be classified as CRZ-I with a buffer zone of at least 50 metres.

xiv. Dredged material will not be disposed within the CRZ area.

xv. Sand dunes will be classified as CRZ-I.

xvi. Parks, Play grounds, regional parks, green zones and other non-buildable areas falling within CRZ-II areas are categorised as CRZ-III.

xvii. Government of Goa will not make any changes in the approved categorisation of CRZ areas without prior approval of Ministry of Environment & Forests, Government of India.

xviii. Government of Goa will give wide publicity to CZMP and indicate the list of places where it is available/can be inspected.

B. Special Conditions/Modifications/Classification**A. CRZ along sea coast****Pernem Taluka**

i. Tiracol Fort area is classified as CRZ-I and settlement area is classified as CRZ-III.

ii. The whole stretch of Querim is classified as CRZ-I because of outstanding natural beauty and sand dune area except settlement area which is classified as CRZ-III.

iii. The whole stretch falling in Paliem village is classified as CRZ-III.

iv. Sand dune and mangrove areas falling in Arambol village are classified as CRZ-I except settlement area which is classified as CRZ-III.

v. Settlement area falling in Mandrem village is classified as CRZ-III. Sand dunes, mangroves and turtle nesting sites are classified as CRZ-I.

vi. Sand dunes, mangroves and turtle nesting sites falling in Morgim village are classified as CRZ-I and settlement area is classified as CRZ-III.

Bardez Taluka

i. In Anjuna village, Chapora Fort is classified as CRZ-I and rest of the area is classified as CRZ-III.

ii. Calangute area is classified as CRZ-III except sand dunes which is classified as CRZ-I.

iii. Candolim is classified as CRZ-III except sand dunes and forts which are classified as CRZ-I.

Tiswadi Taluka

i. Dona Paula is classified as CRZ-I being a fort area.

Mormugao Taluka

i. Substantially built up area of Vasco having approach roads, drainage and other infrastructural

facilities is classified as CRZ-II, rest is classified as CRZ-III.

ii. Dabolim, Chicalim, Chicolna, Issorcim and Sancoale areas are classified as CRZ-III.

iii. Pale and Velsao areas are classified as CRZ-III. Cansaulim and Arossim are classified as CRZ-III except sand dunes which are classified as CRZ-I.

Salcete Taluka

i. The entire villages falling in Salcete Taluka namely, Utorda, Majorda, Gonsua, Betalbatim, Colva Sernabatim, Benaulim, Varca and Cavelossim are classified as CRZ-III except sand dunes which are classified as CRZ-I.

Quepem Taluka

i. The village of Quitol and Naquerim are classified as CRZ-III.

Canacona Taluka

i. The whole of Cola stretch is classified as CRZ-I except settlement area which is classified as CRZ-III.

ii. In Agonda, the entire Agonda village is classified as CRZ-I except built up areas which are classified as CRZ-III.

iii. Nagarcem area is classified as CRZ-I except settlement and built up areas which are classified as CRZ-III.

iv. Areas falling in Poinguinim village are classified as CRZ-III.

v. In Loliem, the entire stretch is classified as CRZ-I except settlement and built up areas which are classified as CRZ-III.

B. CRZ along banks of rivers, backwaters and creeks:

i. Along the rivers namely Tiracol, Chapora, Mandovi, Zuari, Sal, Talpona, creeks and backwaters in Goa influenced by tidal action, the extent of CRZ will be either 100 m or width of the river or creek or backwater whichever is less.

ii. Along Tiracol river, tidal influence is felt up to Patradevi. All the areas up to Patradevi within the CRZ having mangroves including mouth of Kerim bay, near Paliem, Densua Konad, Naibag and Torxem are classified as CRZ-I and rest as CRZ-III.

iii. According to NIO, in Chapora river, tidal influence is felt up to Ibrampur in Tillari river whereas in Osaina river it is felt up to Belapur.

iv. All along Chapora river, areas with mangroves including areas of river mouth, Siolim, Chopdem, Oxel, Tuembank, Colvale, Revora, Pirna are classified as CRZ-I and other areas classified as CRZ-III.

v. According to NIO, in the various tributaries of Mandovi river i.e. in the Madei river tidal influence is up to Gaulem; in Khandepar river upto Odi Karvada; in Sinquerim up to Verem and the three feeders of other tributary, the Mapusa river, tidal influence is upto Mapusa, Tivim and Mulgao.

vi. The areas at mouth of the river having reserved/protected forests, sand dunes of Caranzalem-Miramar and Nerul and all areas along the bank of river Mandovi having mangrove areas including Nerul, Verem, Ourem, Ribandar, Betim to Britona, outskirts of Mapusa, San Pedro, Banastarim, Volvoi and Savoi-Verem are classified as CRZ-I and rest of the areas, without mangroves and ecologically sensitive areas, are classified as CRZ-III.

vii. According to NIO, among the tributaries of Zuari river namely Sanguem, Kushawati and Siridao tidal influence is felt up to Sanguem, Avedem and Santana respectively.

viii. Dona Paula promontory is classified as CRZ-I. Sao Jacinto island and all mangroves including those at Chicalim, Sancoale, Agassaim, mouth of Cumarjua canal, Mercurim, upstream of Cortalim shipyard, entire length of Zuari river from Cortalim to Macasana are classified as CRZ-I and rest of the area classified as CRZ-III.

ix. In the feeders of river Sal tidal influence is felt up to Benaulim, Chinchinim and Cuncolim.

x. Ecologically sensitive areas along the rivers Sal and tributaries including dunes at Mobor and mangroves at Assolna, Cavelossim, Orlim, Benaulim, Navelim are classified as CRZ-I and the rest of the area is classified as CRZ-III.

xi. The tidal influence in river Talpona is felt up to Bhatpal. Along the banks of Talpona, sand dune areas at the mouth of the river and all the mangroves along the bank are classified as CRZ-I and the rest of the area as CRZ-III.

xii. In river Galgibaga, tidal influence is felt up to Velvada. The Galgibaga sand dunes and mangroves areas including Mashem, K.R. Bridge, Galgibaga, Poinguinim are classified as CRZ-I, and the rest of the area is classified as CRZ-III.

xiii. With respect to Panjim and its environs, the following categorisation is approved:

a. Area along Ourem creek till confluence with Mandovi river is classified as CRZ-II.

b. Area along Mandovi river bank (from confluence with Ourem creek) westwards till the beginning of Children's Park of Campal is classified as CRZ-II.

c. Area on landward side of existing road till Rotunda of Gaspar Dias is classified as CRZ-II.

d. Area west of Sports Authority of India complex up to Rotunda of Gaspar Dias is classified as CRZ-II.

e. Area from Rotunda of Gaspar Dias — Gaspar Dias beach to Caranzalem beach up to Cabo Raj Niwas is classified as CRZ-III.

f. Area from Cabo Raj Niwas to Dona Paula jetty is classified as CRZ-III.

g. Area of Dona Paula cove/bay is classified as CRZ-III up to line of existing authorised developments.

h. Area from Dona Paula cove/bay to Wainginim beach is classified as CRZ-III.

i. The plateau top to the extent is classified as CRZ-II (falling within municipal limits).

j. All areas outside municipal limits are classified as CRZ-III.

k. Wainginim beach is classified as CRZ-III.

l. From Wainginim beach to Siridao Beach and area up to Agassaim bridge is classified as CRZ-III.

The plan submitted by the Goa Government vide their letter No.31/7/TCP/96/221 dated 26-6-96 is not in conformity with the conditions/classification indicated above. These modifications may be made and the modified plan and maps sent to the Ministry within a period of two months for record.

Yours faithfully,

(S.K.MATHUR)

Deputy Secretary to the Government of India

THE NOISE RULES, 2000

On 18th January 2000, a Division Bench of the Goa High Court comprising Justices B.N. Srikrishna and R.M.S. Khandeparkar issued directions in regard to noise pollution, which have changed forever the way in which open-air night functions using amplified sound can be legally held in Goa. The writ petition was filed by Goa Environment Federation, an umbrella organisation comprising environment NGOs and environmentally conscious citizens from Goa.

The thrust of the petition was that standards in regard to ambient air quality in respect of noise, detailed under the Environment Protection Act, were not being followed in the State of Goa. The Goa Government was instead clinging to an old and outdated piece of legislation, the Madhya Pradesh Noise Control Act, which liberally permitted the authorities to grant permissions for such functions at all hours of the day or night. Such open-air night parties, using amplifiers of high wattage, were causing serious disturbance to the citizens living in such areas. The petitioners complained that noise pollution in several parts of the State of Goa had reached beyond tolerance limits and had become a major threat to public health.

Directions issued by the authorities were also being misused or not being implemented in order to enable vested interests, tourism lobbies and politically influential individuals to continue with sound polluting activities, even though these severely impacted public health and tranquility. The petition annexed copies of numerous complaints made by the people to the authorities, detailed lists of the kinds of permissions that were being issued for holding open-air functions, and news reports of acid parties organised by persons from foreign countries in Goa during the tourism season.

The Court's interim order prohibited playing of music on any amplifier in open areas between 10 pm and 7 am except with special permission from the Home Secretary, who would record the reasons in writing as to why such permission was granted.

Subsequently when it was drawn to the attention of the Court that some parties were still flouting the interim orders, the Court issued *suo moto* contempt proceedings against the offenders. The interim order had the effect of immediately bringing to a halt all open-air late night parties which required amplified music.

Shortly thereafter, the Central Government issued Notification dated 14.2.2000 under the Environment Protection Act called the Noise Pollution (Regulation & Control) Rules, 2000, which stated the ambient air quality standards in respect of noise for different areas/zones to be followed all over the country. Night time hours are defined under the regulation as 10 pm to 6 am.

The Court directed the State Government to place before the Court a comprehensive scheme on how noise pollution would be controlled in the State of Goa, keeping in mind the provisions of the Noise Rules, 2000. The scheme was submitted to the Court on affidavit by Under Secretary (Home), Government of Goa on 1st January 2001.

The main features of the scheme are as follows:

i. It lists the authorities designated for maintenance of ambient air quality standards as under:

1. District Magistrate, North, Panjim, Goa
 2. District Magistrate, South, Margao, Goa
 3. Director General of Police-Goa, Panjim, Goa
- or any other person/persons as may be designated by the State Government by separate orders.

ii. It categorises into industrial, commercial, residential and silent zones the different areas in Goa for the purpose of implementation of Noise Standards.

iii. It records that signboards indicating silent zones will be erected at appropriate places.

iv. It states that sound level measuring instruments/sound level meters will be purchased for use by the Police Department/enforcing authorities.

v. It lists the officers to whom complaints from the public can be made regarding noise pollution.

Highlights of the Noise Rules, 2000:

- No permission can be granted by any authority for use of public address system in the open after 10.00 pm and before 6.00 am. No exception is possible. Any person or organisation making noise on amplified system after 10.00 pm is violating the law and can be prosecuted under the provisions of the Environment Protection Act, 1986.

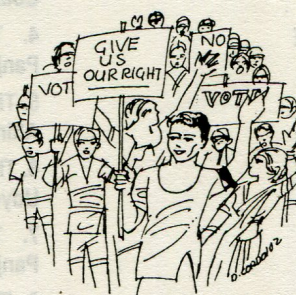
- Authorities (sub-divisional magistrates) can only grant permissions for use of amplified public address system in the open for the period 6.00 am - 10.00 pm. Only the District Magistrates (North and South) can grant permissions after 10.00 pm, provided the function is within closed premises. District Magistrates cannot grant permission for use of any amplified public address system after 10.00 pm.

- After permission has been procured, the sound must fall within the sound limits prescribed in the Noise Rules. This can be measured on a sound meter.

- Any person violating the Noise Rules is liable to be arrested under the stringent provisions of the Environment Protection Act, 1986.

- If the authorities do not act to stop violation of the Noise Rules a citizen can file a complaint with the District Magistrate and he is bound to act.

The Noise Rules, 2000, override the Madhya Pradesh Control of Music and Noises Act. The Noise Rules are issued under a Central Act, whereas the MP Act is a local State Act. Central Acts override State Acts.



Important Government Circulars on Noise

No.7/4/98/STE/DIR/754
Office of the Director,
Department of Science,
Technology & Environment,
Opp. Saligao Seminary,
Saligao, Bardez-Goa 403 511
Dated: 19.9.2000

Most immediate
No.7-4-98/STE/DIR/672
Office of the Director
Department of Science,
Technology & Environment
Opp. Saligao Seminary
Saligao, Bardez-Goa
Pin - 403 511
Dated: 16th August, 2000

NOTIFICATION

In pursuance of sub-rule (2) or rule 3 of the Noise Pollution (Regulation and Control) Rules, 2000, hereinafter called the 'said Rules' the Government of Goa hereby categorises the areas declared as industrial, commercial and residential vide the following notifications issued by the Government of Goa as industrial, commercial and residential areas for the purpose of said sub-rule (2) of rule 3 of the said Rules.

1. Regional Plan for Goa, 2001 A.D. (Official Gazette series III, No.44 dated 26th January, 1999).
2. ODP for the town of Vasco (VPDA/400/ODP/2000-01/365 in Official Gazette Series III No.12 dated 22nd June 2000).
3. ODP for town of Panjim (NGPDA/ODP-12/409/2000 in Official Gazette Series III No.6 dated 11th May 2000).
4. ODP for town of Ponda (Public Notice in Official Gazette Series III, No.47 dated 17th February, 2000).
5. ODP for town of Margao (Public Notice in Official Gazette Series III, No.19 dated 10th August, 2000).
6. ODP for town of Mapusa (Public Notice in Official Gazette Series III, No.49 dated 5th March, 2000).
7. Development Plan Regulations 2000 notified vide Official Gazette, Series III, No.19 dated 10th August, 2000).

Further, in pursuance of sub-rule (5) of rule 3 of the said Rules, the Government hereby declares an area comprising of 10 mts. radius around all hospitals, educational institutions and courts as silence area/zone for the purpose of the said Rules.

By order and in the name of the
Governor of Goa
Sd/-
(Dr. N.P.S. Varde)
Director/Joint Secy, STE

CIRCULAR

As you are aware, the Government of India through the Ministry of Environment & Forests have notified the Noise Pollution (Control & Regulation) Rules, 1999, in exercise of the powers conferred by the Environment (Protection) Act, 1986 (29 of 1986). These Rules have come into force on 14th February 2000 all over the country. A copy of the same is enclosed herewith for ready reference.

This circular is issued to bring to the notice of all the concerned authorities, the provisions of sub section 4 of section 3 of the said Rules reproduced below.

'All development authorities, local bodies and other concerned authorities while planning developmental activity or carrying out functions relating to town & country planning shall take into consideration all aspects of noise pollution as a parameter of quality of life to avoid noise menace and to achieve the objective of maintaining the ambient air quality standards in respect of noise.'

I am hereby directed to convey to you, that the provisions of the above clause should be implemented appropriately by all the concerned authorities. You are kindly requested to ensure that all the 'Departments/Local Authorities' under your jurisdiction undertake the necessary steps in this connection.

(Dr. N.P.S. Varde)
Director/Joint Secretary, STE

Encl: As above

To,

1. The Chief Town Planner, Town & Country Planning Department, Old G.M.C. Complex, Panjim.
2. The Member Secretaries (NGPDA), (SGPDA) & (MPDA).
3. The Director of Municipal Administration, Collectorate Building, Panjim.
4. The Director of Panchayats, Junta House, Panjim.
5. The Chief Engineer, Public Works Department, Altinho, Panjim.
6. The Director, Directorate of Industries & Mines, Udyog Bhavan, Panjim.
7. The Member Secretary, Goa SPCB, Patto, Panjim.
8. The Collectors (North & South).

Noise Standards

Area Code	Category of Area/Zone	Limits in dB(A) Leq* Day Time	N i g h t
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

(Both the State Pollution Control Board and the Police have acquired hand-held, portable meters that measure decibel values. Ensure that these meters are used by filing complaints and insisting that the noise level is measured by the concerned authority.)

Note:-

1. Day time shall mean from 6.00 am to 10.00 pm.
2. Night time shall mean from 10.00 pm to 6.00 am.
3. Silence zone is defined as an area comprising not less than 100 meters around hospitals, educational institutions and courts. The silence zones are zones which are declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

Environment Laws

All the laws listed and discussed in these pages: where does one get copies?

One good source is the *Goa Law Times*. This publication reports on judgements of the Bombay High Court and also prints the texts of various laws as they appear in the gazette. Every Goan lawyer is a subscriber and will have past copies in bound form.

The other official source is the *Government Printing Press*. The Bombay High Court, in a significant judgement, directed the Goa Government to have all the laws valid in the state of Goa printed for easy availability to the public. The Government Printing Press rose to the occasion and over the past year at least, most of these laws are now available at the press on sale.

Copies of every law appear in the *Goa Gazette*. You can subscribe to this publication from the Government Printing Press. Of course, a new subscription will only give you access to new laws coming into force in the state. So where does one get past issues? We go to the Central Library, which has all the relevant gazettes neatly bound in volumes. You can ask for the volume you, locate the text of the law you want, and ask the clerk there to xerox the pages for you at cost. But for this option to work, you must know the date of the particular gazette in which the text appeared.

If all the above fail, ask the *Goa Foundation*.

Rules regarding Municipal Wastes

The Municipal Solid Waste (MSW) Rules were notified on September 25, 2000, under the provisions of the Environment Protection Act. They have come into force in the entire country from that date.

Though the MSW Rules are not perfect (they have been drafted by bureaucrats with little exposure to field conditions), Goan citizens can rely on them to get municipal councils and panchayats to clean up their areas on a scientific, planned basis.

Under the Goa Municipalities Act, 1968, Municipal Councils are also responsible for the removal of filth, nuisance and rubbish (chapter XVI) from public places. However, apart from these general clauses, there are no specific provisions under the Municipalities Act requiring the council to deal intelligently with the garbage problem.

The deficiency in the Municipalities Act in relation to removal and handling of garbage, however, is more than adequately compensated by detailed clauses relating to garbage handling in the MSW Rules and the Goa Non-Biodegradable Garbage (Control) Act, 1996.

As per the Rules, the Municipal Councils must take steps to ensure that bio-degradable garbage is treated by process of bioconversion or other safe scientific methods. Biodegradable waste to be processed by composting, vermicomposting, anaerobic digestion or other forms of appropriate biological processing. Organic wastes from fruit and vegetable markets, slaughter houses etc are to be made use of. The burning of waste (garbage, leaves) is prohibited.

Dumping of garbage in landfills is no longer permissible. New sites can only be opened after a detailed environment enquiry. When opened, they must follow certain steps to ensure that the garbage does not cause a hazard to nearby residential areas. The areas must be fenced and kept out of the reach of stray animals.

Landfilling is to be resorted to for non-biodegradable, inert and other waste not suitable for recycling or biological processing. In other words, dumping should be resorted to only for useless, unrecyclable wastes. If the majority of wastes are subjected to biological treatment (e.g. vermicomposting), this will reduce the volume of wastes and therefore requirement for large landfill site too will be reduced. Land is too valuable a resource to be wasted by unscientific dumping.

Steps are to be taken as provided to prevent pollution and for water and air quality monitoring. The landfill operator will plant adequate species of trees as vegetative cover to prevent erosion.

Post-closure care of landfill shall be conducted for at least fifteen years. Setting up of waste processing and disposal facilities (31.12.2003); improvement of existing sites (31.12.2001) and identification of fresh sites for the future (31.12.2002) to be completed by the local authority within time period specified.

Rules regarding Medical Wastes

The Biomedical Waste (Management & Handling) Rules were notified under the Environment Protection Act in 1998. These rules deal largely with biomedical wastes generated by hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, etc.

The rules required all such institutions not to mix up biomedical wastes with other wastes. The waste must, in fact, be segregated and disposed off as per its composition, in plastic bags which are either red, yellow, blue and black. Some of these wastes are for incineration, some for deep burial or disposal in municipal landfill sites, etc.

Originally the Public Health Department was made the authority for implementing the rules. Later a fresh Notification was issued, handing over implementation of these rules to the already over-worked Goa State Pollution Control Board.

As of today, though some of the hospitals in Goa are segregating the wastes, these are eventually mixed up with the Municipal Councils' waste and discharged in municipal landfills.

The worst danger to public health ironically is from the incinerator put up by the Goa Medical College to deal with such wastes. The incinerator, so-called, is basically a combustion chamber and all categories of mixed waste are dumped in it for burning. That such a practice is resorted to by the State's premier medical institution is something to be deplored. The incinerator, in fact, was less of a danger to public health when it broke down and was unable to work for practically a year.

The basic scheme of the Biomedical Waste Rules is that occupiers of biomedical waste generating institutions will seek authorisation under these rules. The authorisation will be valid for 3 years and no biomedical waste institution will function or discharge its wastes without making the legal arrangements set out in the rules.

Of course, all this will work only if there is an area in which this waste can be safely buried or otherwise dealt with. Till now, Goa has no such facility and therefore its population is exposed continuously to such hazardous wastes.

Rules regarding Plastic Bags

On September 2, 1999 the Ministry of Environment notified the Recycled Plastics Management and Usage Rules, 1999. They came into force on 2.12.1999. The basic thrust of these Rules was to control the thickness of carry bags made of virgin or recycled plastic. Such bags henceforth would not be less than 20 microns. This aspect of the Notification is now being gradually enforced throughout the country.

The Plastic Manufacturers Association attempted to undermine the Notification by manufacturing knurled bags. Such plastic bags had a bubble like feature which put them in the 20 microns category in thickness so that the manufacture of cheaper plastic bags could continue. This form of cheating was not only against the spirit of the Environment Protection Act, it also drove out of business several entrepreneurs who had taken the trouble to manufacture paper bags.

Finding out that even 20 microns did not make much of a difference to plastic litter in the Goan environment, the Goa Government brought out a notification raising the limit to 100 microns. However, the government has been diffident to enforce the 100 micron limit, even though it was issued under the Goa Non-Biodegradable Garbage Act.

After recent discussions, representatives of the plastic industries and NGOs, the thickness limit has now been brought down to 40 microns for a trial period of one year. The new 40 micron limit comes into force from July 1, 2002. If this does not work to control plastic waste pollution and litter, the Government will once again notify and implement the 100 micron limit.

One of the provisions of the Plastic Usage Rules which has not yet been implemented is that manufacturers shall print on each pack of carry bags as to whether these are made of recycled material or of virgin plastic. The State Government is now setting up a core monitoring group comprising representatives of the industry, NGOs and government to ensure that the rules are implemented and that those violating them are punished.

Non-Biodegradable Wastes

The Goa Non-Biodegradable Garbage (Control) Act, 1996 was passed by the Goa Assembly to bring plastic litter under control. The Act came into force on January 1, 1998, but was not implemented by any of the local authorities. In the initial stage it was only applied to the three major talukas of Bardez, Tiswadi and Salcete. In April 2002, the Act was made applicable to all talukas in the State.

One of the principal features of the Act is the setting up of Garbage Management Committees (GMC) in which local citizens must be involved. However none of the Councillors want local citizens on any committees since they consider this an unwarranted intrusion on their decision-making. Hence few GMCs have been set up. Those set up do not function since there are no norms or rules governing the meetings of these agencies.

The other main feature of the Act is the requirement that wet waste be separated from dry waste including plastic and the two disposed of separately. Here too, there has been poor compliance. No resident in any town or village wants any garbage bins in front of his house, whether these bins are coloured black or green. As every one knows, any bin is now an eyesore, since the authorities do not bother to clean them up regularly and their contents are removed and spread outside the bins by stray animals.

Anti-Smoking Act

The Goa Prohibition on Smoking & Spitting Act, 1997 which was passed by the Goa Assembly to prohibit the use of tobacco in any form and spitting in the place of public work, or in public service vehicles came into force on 27th August 1999. The Act is in the nature of a pioneering, proactive legislation and reflects changing attitudes to problems created by tobacco and smoking not just in Goa but all over the world. The Act prohibits all advertisements on smoking and chewing of tobacco. No one is permitted directly or indirectly to promote the use of tobacco or any tobacco product within the State of Goa. Advertisement is defined as follows:

"(a) 'advertisement' means and includes any notice, circular, wall paper, pamphlets, display on hoardings or any visible representation made by means of any light, sound, smoke, gas, writing instruments, stickers, symbol, colours, logo, trade mark/symbol, display on articles like T-shirts, shoes, sportswear, sport gears, caps, carry bags, telephone booths, etc., or any other means which has direct or indirect effect of promoting smoking and or tobacco chewing and the expression 'advertise' shall be construed accordingly;"

Under the Act, place of public work or use is also defined and includes:-

"(f) 'place of public work or use' means a place declared as such under Section 3 of this Act, and includes auditoria, cinema/ conference/seminar

halls, hospital buildings, health institutions, amusement centres, restaurants, eating houses, hotel lounges, other waiting lounges, public offices, court buildings, educational institutions, libraries, bus stands, ferry boats, places of worship, beaches, sports stadia and the like which are visited by the general public but does not include other open places;"

Sale of tobacco in any other form or chewing tobacco within the area of 100 m. around places of worship or educational institutions is absolutely banned. Fines for violating the law may be upto Rs 1000. Violating some sections of the law may also get a prison term of 3 months or a fine going upto Rs 10,000. Government can notify Officers to compound offences under the Act on payment of certain sums.

By a subsequent notification the Government has explicitly declared the following places as places of public work or use in Goa for the purposes of the Act:

- a. Auditoria;
- b. Cinema/Conference/Seminar halls;
- c. Hospital buildings;
- d. Health institutions;
- e. Court buildings;
- f. Educational institutions;
- g. Libraries
- h. Places of worship;
- i. Airports, except in designated areas;
- j. Buses;
- k. Waiting rooms at railway stations;
- l. Restaurants, except in designated areas;
- m. Eating houses/lounges in hotels, except in designated areas;

Though these notifications have come into force, the Government has not managed to educate the public about these provisions. For example, smoking in all places notified as 'public' under the Act can only be done henceforth in specified areas. Citizens concerned about the harmful effects of smoking should take up these issues with relevant persons in charge of such public places and insist that Boards be put up declaring the zones as non-smoking areas with clearly demarcated corners as smoking zones. It is only after this is done that non-smokers will get some relief from Cigarette Smoking.

Anti-Mosquito Laws

In 1993 when the incidents of Malaria became a very serious threat to public health, the Government brought in amendments to the Goa Public Health Act of 1985 empowering health officers to take steps to prohibit the breeding of mosquitoes in collections of water.

Under the amendment, the health officer was given sufficient powers to visit building sites and to direct the owners to take anti-larval measures at such sites. Detailed provisions were laid down in connection with prevention of all kinds of containers which might collect water and provide breeding sites for mosquitoes. The health officer could also fine persons who allow mosquito larvae to develop in any portion of their plots.

All immigrant workers at the site had to have Health Cards/Certificate that they were not carrying any malarial parasites. These public health officers who did their duty were generally pulled up by Ministers to whom the builders complained with the result that any initiative displayed by health officers soon became completely extinct.

In 1999 the Government notified a new set of bye-laws dealing with malaria control which the municipal councils were advised to adopt. These bye-laws called the Goa (Control of Malaria and Other Mosquito-Borne Diseases) Bye-laws, 1998 echo many of the provisions which have already come into force under the amendment to the Public Health Act discussed above.

Under the bye-laws, the Chief Officers have also been given the power to inspect the premises to check for possible mosquito-breeding sites and to take suitable actions where such sites are already breeding mosquitoes. It is not known whether any of the municipal councils has passed the required resolution to adopt these byelaws but as can be seen the Government continues to be convinced— despite all evidence to the contrary—that merely issuing notifications and bye-laws will get rid of mosquitoes.

The citizenry is now coming to the opinion that a special law is required to keep ministers from interfering continuously to prevent the enforcement of laws. For those who wish to take up active implementation of this law, it is recommended that he or she visits the office of the Directorate of Health Services and the Malaria Control Centre at Campal. The officers in these two institutions are willing to train persons interested in malaria control. They have, for example, a programme with ACDIL to educate school children about malaria control issues. They could also be requested to deal with violations of these malaria control laws, if one finds that there is a need to do so.

Official Response to Environmental Issues

• THE DEPARTMENT OF SCIENCE, TECHNOLOGY & ENVIRONMENT (DSTE)

The DSTE was set up in 1983, in the Government Secretariat at Panjim, and is now situated in a modern premises on the Saligao plateau, Bardez (opposite the Saligao Seminary), 12 kms from Panjim.

Organisation : The Department is headed by a Director (Dr. N.P.S. Varde). The Goa State Pollution Control Board (GSPCB), the Goa Coastal Zone Management Authority (GCZMA), the Goa State Council of Science and Technology (GSCST), the Goa Energy Development Agency (GEDA) and the Goa Environment Protection Council (GEPC) are 'statutory/advisory' authorities, under the purview of the Department. They implement the various legislations pertaining to pollution control/environmental protection and other activities of the Department aimed at promotion of science & technology and implementation of non-conventional and renewable energy programmes.

Activities: Regular and periodic activities undertaken by the DSTE to achieve its objectives include the following:

1. Promotion of appropriate S&T and environmental projects relevant to the needs of the State;
2. Application of Remote Sensing Technology for management of natural resources and planning;
3. Implementation of science popularisation and environmental awareness drives;
4. Drafting of environmental legislations proposed by the Government;
5. Nodal action to implement 'State/Central' Acts/legislations on environment and pollution control through the respective enforcement authorities;
6. Popularisation and dissemination of non-conventional and renewable energy sources.

Services include:

- i. Promotion of S&T projects and activities: Educational institutions, research institutions,

bonafide NGOs and relevant government organisations can avail of schemes under this head. Funds are released in the form of grant-in-aid, or otherwise, to undertake appropriate S&T projects, science popularisation activities, environmental awareness drives and scientific workshops/seminars. Applications in the prescribed format (available at DSTE, Saligao) should be made to the Director, DSTE & Member Secretary, GSCST (addresses nos.1 and 2 below). The proposals are scrutinised for approval within one month of the date of receipt of completed applications.

ii. Non-Conventional and Renewable Energy Sources: Activities under this scheme are undertaken through the Goa Energy Development Agency (GEDA), an agency of the government under the purview of the DSTE. The mandate of GEDA is to promote non-conventional and renewable energy sources and gadgets through popularisation campaigns, demonstrations and offer of incentives. While achieving these objectives the public is also made aware of energy crisis. Environmental products and services offered by GEDA are detailed below.

Facilities/items to be installed on the site as per the desired capacity:

1. Solar Water Heating Systems: These systems are available in the capacity range of 50 litres per day (LPD) onwards. The subsidy offered for such a system is 50% of the actual cost or Rs 1,000 per sq mt of collector area, whichever is less. Individuals, hotels, canteens, hospitals and industries can avail of such systems, on 'first come first serve' basis. Interested 'individual parties' should contact the office.
2. Bio-Gas Plants: The scheme to promote establishment of bio-gas plants is presently implemented through the Directorate of Agriculture and its Zonal Agricultural Offices. Subsidies are offered for installation of different sizes of family type (1 cum-4 cum) and community type (8 cum-85 cum.) bio-gas plants.
3. Smokeless Chullahs: The scheme to promote smokeless chullahs is presently implemented

through the Rural Development Agency. Subsidies are offered for installation of mud fixed chullahs as well as metallic portable chullahs.

Goa Science Centre, Miramar:

The latest feather in the cap of DSTE is the opening of the Goa Science Centre at Miramar, in collaboration with the National Council of Science Museums, Kolkatta.

Useful contact addresses:

1. The Director/Jt. Secretary, Office of the Director, Department of Science, Technology & Environment,

Opp. Saligao Seminary,
Saligao, Bardez, Goa 403 511.
Tel. No.: (0832) 407186/407187/407189
Fax No.: (0832) 407186
Email: ste@goa.nic.in

2. The Member Secretary, (GSCST/GCZMA),
C/o. Department of Science, Technology & Environment,
Opp. Saligao Seminary,
Saligao, Bardez, Goa 403 511.
Tel. No.: (0832) 407186/407187/407189
Fax No.: (0832) 407186
Email: ste@goa.nic.in

3. The Member Secretary,
Goa State Pollution Control Board,
243, Patto, Panjim - Goa 403 001.
Tel. No.: (0832) 227974/432684
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4. The Member Secretary,
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• THE FOREST DEPARTMENT

Government of Goa,
Behind Old Goa Medical Complex,
Campal, Panjim 403 001.

Phones: 225926/224747

The Forest Department is an interesting place to drop in ever since its policies were changed two decades ago from earning revenue from felling trees to providing protection for forests. A couple of extremely good Conservators have come and gone, most notable being B.P. Sinha, Kishore Rao and more recently, Richard D'Souza.

Ravi Naik, Goa's Chief Minister, went out of his way to gain Kishore Rao's dismissal because the latter refused to collaborate with his schemes to

• THE GOA STATE COASTAL ZONE MANAGEMENT AUTHORITY (GCZMA)

C/o Department of Science, Technology & Environment, Saligao, Goa.

Set up by the Ministry of Environment and Forests under directions of the Supreme Court, the GCZMA has been given the task of checking violations of the CRZ notification along Goa's coastal areas. The first GCZMA was notified on 26.11.98 and its composition was modified by another notification dated 30.6.99. The Ministry has reconstituted the Authority by a notification dated 4.1.2002. The new tenure of the Authority is for three years. The composition of the Authority is given below.

• GOA STATE POLLUTION CONTROL BOARD

Patto, Panjim, Goa.

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The Board, whose mandate it is to control air and water pollution in Goa under the Air and Water Pollution Control Acts, and to act as a critical institution for enforcing provisions of the Environment Protection Act, was formed in 1988, after Goa became a State.

Though it has enormous powers to enforce environment protection measures in the state, the Board has been rendered progressively worthless after politicians began to fight for the chairman's post because of the perceived benefits of making money from polluters. Polluters, in fact, have learnt that a visit to the SPCB is adequate to treat most of the problems they may face on account of their violations of environment laws. They do not need to treat their effluent after that. No wonder the general public refers to the GSPCB as the Goa Pollution Board.

The High Court admitted a petition restraining the Arecio D'Souza (appointed Chairperson of the Board in 1999) from attending any important meetings of the Board or making decisions with regard to any major subject which came before the Board when the Court was informed in a writ petition filed by the Goa Foundation that D'Souza was a high school geography teacher with no environmental qualifications which would justify his appointment to this very important post in the scheme of environment protection in Goa. Subsequently, the High Court also admitted another petition filed by the GF challenging the nomination of all the individual members of the Board.

When the Board was reconstituted in April 2002, Arecio D'Souza was dropped from the Chairperson's post.



Forest Department officials maintain vigil around a protected Olive Ridley turtle nest at Morgim

embroil Kashinath Jhalmi in the Valpoi deforestation case. He lasted a mere sixteen months but during that time he did a great deal for Goa's forests. He will be remembered by people in Goa for some time.

Richard D'Souza's classic contribution came in the form of the detailed notifications issued in June 1999 declaring vast areas of the Western Ghats (Madei and Netravali) as wild life sanctuaries. Goa has not been the same ever since. The notifications came to be issued during President's Rule. Late last year, the Goa Government took a decision at the Cabinet level to denotify 75% of the areas notified. But since the decision must be approved by the Indian Board of Wild Life and the Supreme Court, both of which are unlikely to agree, D'Souza's contribution to the absolute protection of Goa's forests and wildlife is likely to survive.

The Authority which could have been a powerful institution to protect coastal areas is rendered extremely weak and ineffective as it has barely any funds and staff. It has not been able to take effective action against CRZ violators. Since the Chairperson is the Chief Secretary, the Authority is not able to meet often because as chief of the administration, the Chief Secretary rarely has the time to call meetings. The last meeting of the Authority was in September 2001!

Composition of the GCZMA:

1. Chief Secretary, Government of Goa, *Chairman*
2. Secretary, Dept. of Environment, GOG.
3. Conservator of Forests, GOG.
4. Director, Department of Tourism, GOG.
5. Dr. Arvind Untawale, Ex-NIO, Panjim.
6. Dr. B.R. Subrahmanyam, Director, ICMAM, Depart of Ocean Technology, Chennai.
7. Dr. Claude Alvares, Goa Foundation, Mapusa.
8. Director and Joint Secretary, Department of Science, Technology and Environment, GOG, *Member Secretary*.

• THE GOA STATE ENVIRONMENT PROTECTION COUNCIL

The Environment Council was set up as a consequence of a directive from the Prime Minister's office to all the states. At present, the Goa Council has more than forty members and includes some environmental groups.

It seems to be basically a talk shop for the State's environment elite to discuss environmental issues and to make recommendations.

Recommendations are of purely advisory nature and are not binding on the Government.

The Governor is the Chairman. The Council did not meet at all from October 1987 upto January 1992: this reflects on the Government's commitment to issues connected with the environment of the State!

However, the Council is now meeting more regularly due to the initiative of Governor Mohd. Fazal.

INTEGRATED MARINE AND COASTAL AREA MANAGEMENT (ICMAM) DIRECTORATE

Address: c/o DSTE, Saligao

A recent entrant to the list of organisations conducting research on various aspects of the Goan environment has been the Integrated Marine and Coastal Area Management (ICMAM) Project Directorate, which is part of the Department of Ocean Development, Chennai. ICMAM, in collaboration with the Department of Science, Technology and Environment, Government of Goa, is engaged in a programme to develop an Integrated Coastal and Marine Area Management Plan for Goa.

The project documents define ICMAM as follows: 'Integrated Coastal and Marine Area Management (ICMAM), often also referred as Integrated Coastal Zone Management (ICZM), is an adaptive process of resources management for sustainable development in coastal and marine areas. In other words, it is a process of governance and consists of the legal and institutional framework necessary to ensure that development and management is integrated with environmental (including social) goals and is made with the participation of those affected. The management issues are based on scientific knowledge derived from several scientific investigations on coastal habitats as well as coastal and oceanic processes.'

The project has been underway for over two years. At the outset, a workshop was held in Goa in which scientists working on environmental issues in Goa presented papers. This was followed up by two workshops in North and South Goa, which attempted to get feedback from a wider section of the Goan population, including NGOs, citizen's groups and people's representatives. Unfortunately, primary stakeholders, particularly those from the poorer strata of society, were not well represented.

The project has identified the following key issues:

1. Alteration of land use pattern including sand dunes;
2. Socio-cultural changes due to tourism development;
3. Groundwater depletion due to over exploitation of fresh water in the wells;
4. Solid waste disposal;
5. Decreasing public access;
6. Decreasing aesthetics of beaches; and,
7. Disposal of mining rejects and mine washes.

TATA ENERGY RESEARCH INSTITUTE

Western Regional Centre

Models Residency,

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Or visit their web site : www.teriin.org/teri-wr

The Western Regional Centre of TERI is based in Goa and was set up in 1996. TERI works in the interface between development and environment and undertakes research to help, develop and promote policies and institutions for the sustainable use of natural resources. It aims at policy research in the following areas: Mining, Tourism, Watershed Management, Coastal Area Management, Land Use and Land Cover Studies, Forest/Sanctuaries and People, Governance Issues, Quality of Life, Population Environment Studies

TERI endeavours to disseminate information and promote implementations and suggestions arising through research by interaction with decision-makers, intellectuals, stakeholders, other NGOs and the general public, and through publications, seminars and representation on government committees. It aims at encouraging local skills, providing appropriate training facilities for capacity building and alternatives to ensure the sustainable use of natural resources.

TERI-Goa has research links with the National Institute of Oceanography and Goa University at a local level and on a wider scale it has links with Population Consumption Environment network, Asian Population Network, Mining Minerals and Sustainable Development (MMSD) UK, Mining and Energy Research Network (MERN) UK, IACR, Rothamstead, European network of researchers in Italy, Portugal and Spain. This network is being expanded to coastal countries of south Asia through a Coastal Policy Newsletter, COASTIN.

Currently TERI-Goa is engaged in developing indicators to measure quality of life, health and well-being in the mining sector. TERI-Goa is also working to develop a framework for decision making for coastal management that incorporates the concept of sustainability.

The best known work of TERI-Goa is its report on mining, titled: 'Areawide environmental quality management (AEQM) plan for the mining belt of Goa.' Everything one wants to know about mining and its environmental impact on Goa's environment and ecology is there, together with the solutions.

Familiar Research

The number of institutions conducting research studies on environmental issues in Goa and the wide variety of projects has grown so much in recent years that it has become difficult to keep track of all the research that is going on. One of the peculiarities of the situation in Goa is that despite the availability of considerable expertise right here, research is usually farmed out to institutions from outside the state. Thus, we have SGS Consultants coming from Hyderabad to do the EIA of Meta Strips. Or CES doing the Regional Plan for Goa. Often, these researchers pay very few visits to Goa and rely entirely on secondary data.

The vital question here is what these studies have all achieved. A familiar refrain from the unending round of workshops is the view of socially-committed scientists that data on which-ever issue happens to be the flavour of the month is hardly lacking. Studies have been conducted on every possible aspect of the environment, detailed recommendations have been made, but the result is exactly zero when it comes to implementation.

Discussions with some of these scientists shows that they are completely frustrated with the whole process and would prefer to keep out of much of the research currently underway, as it is merely resurrecting and repackaging old data. Earlier studies (often commissioned by the Government itself) have made appropriate recommendations for protection and conservation of the environment, but they have been totally ignored and the insane pattern of development has continued unchecked.

Research also becomes a way of projecting the pro-environment credentials of the establishment. The Government and industry can and do get considerable publicity from these exercises, which often gives the impression that these bodies are actually interested in doing something about the environment. As soon as the studies are over though, the matter is completely forgotten. All that results is another report and another set of recommendations (usually the same as earlier recommendations) which can provide fodder to silverfish and termites.

There is clearly a need to prioritise and limit the research being conducted. Resources currently being devoted to these repetitive exercises could be channeled towards creating greater public awareness and setting in place appropriate implementation mechanisms.

Goa's Green High Court

High Courts in the country have 'green benches': a day set aside every week during which a division bench will hear only environment cases. The Supreme Court had a green bench, but now no longer. But in lucky Goa, for the space of two full years, the High Court (with Justices R.K. Batta and R.M.S. Khandeparkar) became a permanent green bench taking up environment issues on a daily basis. And in the process it set up significant precedents in environment law and jurisprudence.

When judges are moved by compassion or suffering, they write great human rights (or animal rights) judgements. If they are moved by natural beauty, they are bound to deliver resounding and stern environmental directions. Goa's natural beauty is known even to those who have not seen it. Judges see it and notice it and often talk of it openly in the courtroom, whether they reside here or come to sit on a bench when assigned from Mumbai or Nagpur.

The first major environment judgement was passed in 1986 in a case involving the sand dunes. The government followed behind: it was only in 1991 that the CRZ notification finally protected sand dunes. Much before the *Godavarma* case in the apex court, the Panjim bench had already ruled that all forests in Goa would be protected even if the land records showed the nature of the land as anything else. The issue was resolved in the judgement passed in the writ petition, *Shivanand Salgaonkar v/s the Tree Officer*.

During the heady days of Goa's Green Bench, the list of environment cases before the High Court was long, but action in most cases was swift.

The Court took all CRZ violations seriously. The CRZ notification has been in force now for twelve years. However, town planning officials and Ministers found the notification gave them enormous power over those who wished to construct in the pricey 500 metre zone from the High Tide Line.

In order to protect their corruption, every conceivable kind of confusion was introduced into the interpretation of the notification. The result is there for all to see: Calangute has been turned into a horrific concrete jungle; hotels have sprouted everywhere; sand dunes have been devastated.

When such violations were brought to the notice of the High Court, it acted speedily to bring a halt to the violations. Illegal hotels built by powerful Municipal Councillors on Palolem beach were the first to go. Thereafter, the Court took up the issue of illegal constructions in the 200 metre no-development zone of Calangute, Baga and Candolim villages and directed the Panchayats to stop all constructions. Thereafter, it accepted an undertaking from the newly formed Goa Coastal Zone Management Authority that no further approvals would be granted for residential

units in the CRZ of the entire state of Goa. Thus the madness came overnight to a halt. For the past three years, no new approval has been granted for any new construction within 500 metres of the HTL in the entire state of Goa.

The Court also had before it matters like protection of sand dunes, fixing of the High Tide Line (which the Chief Town Planner kept shifting to suit powerful parties), illegal constructions in villages like Colva and preparation and publication of the approved Goa Coastal Zone Management Plan.

But the Court did not restrict the range of its intervention only to coastal problems. The situation relating to the incidence of malaria and schemes to prevent occurrence of malaria were before the High Court for more than two years. Due to the Court's persistence in the matter, the incidence of malaria diminished. The Court has also removed all encroachments from public streets and footpaths. This decision caused a lot of hardship. However, many encroachments were made possible by authorities themselves who received bribes for illegal permits.

The Court has also intervened to stop the Teksid Kalyani foundry which was being erected at Navelim, Bicholim, without environment clearances. It issued an order to stop such illegal constructions in a permanent way by asking the government to send letters to all panchayats and municipalities that they will not allow construction without environment clearance in future.

The Court also took up the question of deprivation of basic needs felt by citizens. It called for the government's plans to supply water to chronically water-deficient areas in Pernem. It also converted into a *suo moto* writ petition an article on the water requirements of Meta Strips: the government conceded that there was a problem and assured the Court that it was not supplying the plant any water till the situation improved for citizens as a whole first. Due to this intervention, Meta Strips was forced to construct a water harvesting tank.

The Goa Government was made to come up with a detailed scheme for monitoring coastal areas, in order to nip mushrooming illegal coastal constructions in the bud. Dust pollution was effectively tackled in the short term by directing that all trucks will be covered with tarpaulin. Applications by truck owners to allow them to use plastic instead of the more expensive tarpaulin were rejected outright by the Court.

The Court passed orders for strict control of noise pollution at night. This despite the fact that the petition was filed during the height of the tourism season and the effect of the order was a dramatic halt, almost overnight, to all the loud music nighttime parties in the tourism belt of Goa. It issued notices to all panchayats and municipalities to produce their plans for disposal of garbage, and for implementation of the provi-

sions of the Goa Non-Biodegradable Garbage Act.

The scope of a petition filed to stop the holding of food festivals on beaches was expanded by the Court to cover all other aspects of cleanliness of beaches as well. The Tourism Department was directed to produce a detailed scheme for maintaining cleanliness on Goan beaches.

As already stated, the Court took a lot of pains to ensure that the CRZ Notification was implemented in Goa. However, realising that CRZ violations were ever on the increase and that by the time offenders were brought to book, much damage had already been done to the beach areas, it made the Goa Government come up with a detailed scheme for monitoring coastal areas, in order to nip such mushrooming illegal constructions in the bud.

Perhaps the fact that the two judges had lived in Goa long enough to appreciate that Goa's best asset is its environment and that on no account should it be sacrificed at the hands of ruthless politicians, spineless bureaucrats and scheming industrialists, was what led Goa's Green Bench to exert itself in the protection of this beautiful state.

Government officials were terrified when environment petitions were filed because no one could fool these two judges. They knew Goa intimately and refused to be reassured with meaningless affidavits. Even better, they understood only too well the nature of Goan society and politics and how Goa's environment was being ruined through unsound policies and unprincipled politics. And they were determined to do all in their power to save this land. For Goa's citizens, genuinely concerned about the deteriorating state of affairs, the judiciary remained their only hope.

There have been great environmental judgements since then too. The judgement upholding the applicability of the Environment Protection Act to hotels is one such example. So also the directions which were issued to try and cure the phenomenal and unbridled corruption of the Town and Country Planning Board and the misuse of lands under the Agricultural Tenancy Act are other examples.

But these occur only when the judges are themselves highly environment conscious or at least have deep knowledge of the environment laws prevalent in the country. Otherwise, often, the short 6-8 week periods for which judges are posted to the High Court Bench barely give judges enough time to comprehend the factual situation, the environment laws and the dire need for judicial activism in the state of Goa.

The legacy of the green bench and the vast basket of pro-environment judgements are bound to be a great boon for all those elements of civil society that wish to rely upon them for resistance to environmental degradation in the years ahead.

Noteworthy Public Interest Litigation

♦ Regarding Environment and Mining

Three writ petitions filed in the year 2001 by villagers from different parts of Goa on the environment pollution due to mining dump sites located on the banks of rivers and the damage caused to agricultural activities received the urgent attention of the High Court and interim orders were passed restraining the continuance of the mining activities. The State Pollution Control Board was also directed to inspect the sites and file detailed reports including suggestions on what is to be done.

The three areas are Advai (WP 77/2001), Sonshi (WP 284/2001) and Khushavati (WP 7/2001).

Advai — The Agricultural Farmers' Association of Advai village prayed for payment of compensation to the farmers due to crop loss, stoppage of further dumping of mining rejects on the existing dumps on the banks of Advai and desilting of Advai *nallah*.

Advai *nallah* is a rivulet starting from Ovalyam village and flowing via Advai to finally join the River Madei. Among the mining companies which have dumped their rejects alongside the *nallah* are Timblos, Bandonkars, Chowgules, Salgaonkars and Sesa Goa. The dump sites, some dead, some active, are more than 50 metres in height. The mining companies have constructed check bunds with laterite rubble and gunny bags, to restrict the flow of water into the *nallah*. However, these preventive measures have proved ineffective as washout from the dumps during the heavy monsoon carrying substantial quantity of eroded material into the *nallah* is visible. All the dump bear marks of rain water erosion on the surface of the dumps.

Sesa Goa Ltd. has even diverted part of the *nallah* passing through their plot for their convenience and the villagers say that this diversion has affected the natural streams feeding water into this *nallah*.

Advai villagers' traditional occupation is mainly agriculture. However it is now becoming very difficult to keep it alive since the dumping of mining rejects has increased manifold during the last decade. That the damage is caused to the farms is evident from the fact that mining companies have had to compensate the villagers for crop loss. However the compensation only partly compensates the loss incurred and in any case the deposition of rejects in their fields leave behind the residual impact of reduction in the productivity of the farm.

The Goa State Pollution Control Board in its report stated that while the company officials' claim that the activities are in compliance with the Environment Management Plan, duly approved by the Indian Bureau of Mines, is true, it appears that the IBM, which is a competent authority under the Mines & Minerals Act, 1957, have approved the dumping of mining rejects outside the areas earmarked for mining. This



Goa High Court Bench

amounts to extension of mining activity into areas not earmarked for mining.

GSPCB concludes its report by stating that:

'Advai *nallah* occupies important position in the agricultural activity in the said area. The State Government has invested substantial amount to install a lift irrigation scheme on the said *nallah* for the benefit of the farmers. Frequent silting and de-silting of the *nallah* with mining rejects and the decline in productivity of the fields affected by the washout from the dumps will in due course of time, make the agriculture in this area an unviable exercise.'

'The issue at Advai is of the conflict between mining and agriculture. If the dumps are allowed to be grown at the present pace, in passage of time erosion from the dumps will damage the agriculture to such extent that the farmers will be compelled to distance themselves from their farms. Even after culmination of the mining, it will not be possible to restore the farms. As such the only remedial measure for protection of Advai *nallah* and thus safeguarding the interests of the agriculture is to restrict the mining activities to the mining areas.

In March 2001, the Court directed the mining companies to immediately stop the dumping on the disputed sites and to take on preventive and remedial steps to avoid further collapse of the dumps. The compensation fixed by the Zonal Agricultural Officer to the farmers was also directed to be paid to the farmers/agriculturists.

On 24th September the Court, after perusing the report of the State Pollution Control Board, directed the mining companies to find alternative sites for depositing the rejects. The Court also

directed that complete desilting be done of the *nallah* under the supervision of the Irrigation Department of the State Government, costs for which would be assigned subsequently. Periodic reports are to be submitted to the Court.

Sonshi — The reliefs prayed for by the villagers mainly pertained to protection of Sonshi *nallah* from mining activities.

Sonshi *nallah* is about 14 kms long. It is not a rainwater drain but a stream which originates in the hillocks near village Volvoilem and after flowing through Sonshi it joins the Harvalem River at the waterfalls. The first 5 kms length of the *nallah* passes through the area covered by mining leases granted to various mining companies including V.M. Salgaonkar, Sesa Goa, V.S. Dempo, P. Timblo & V.G. Quenim.

The mining companies have used the banks of the Sonshi *nallah* for dumping their rejects. Most of the dumps are over 50 metres in height. Although the dumps are not active at present, they are not stable. The runoff from the dumps flow into the river, especially during the rainy season. The dumps show permanent rainwater erosion marks at many places. V.G. Quenim, has one of its mining pits right on the course of the *nallah*. The company has suspended operations on this pit as it is now totally filled with water. Quenim Mining Co. has also permitted Goa Glass Fibre Ltd., Colvale, to dump the accumulated fibreglass waste in one of its abandoned mining pits.

The villagers state that the area on the banks of the *nallah*, which is under the dumps of mining rejects, used to be under cultivation in the olden days. Today, only two of horticultural gardens remain under cultivation.

The Goa State Pollution Control Board report states that the mining activities on the banks of the *nallah* have affected horticultural activities in two ways:

1. Repeated silting of the *nallah* during the rains has altered the course of the *nallah* and the damage to the *nallah* is almost irrevocable. The once perennial *nallah* now gets dried up by January whereas water springs emerge in the deep mining pits.
2. Mining silt is deposited in cultivable lands when the *nallah* waters inundate the fields after heavy showers and this adversely affects the productivity of the soil.

The SPCB report concludes as follows: 'In the conflict between mining and agriculture, agriculture is pushed to a tight corner even though it is known that the mining industry is not expected to last forever. After conclusion of mining activities, rehabilitation of agricultural areas has to be done by the mining company as this is the condition incorporated in the lease deed.' However the situation at Sonshi gives the impression that rehabilitation of the agricultural areas lost in the conflict is a distant dream.

In its order of December 2001, the High Court has directed that the question of supplying water for irrigation needs to be worked out by the Government. In the meantime, temporary arrangements as made earlier are to continue. The mining companies were also directed to install pumps at their cost for supply of water to the villagers.

Kushavati— *Suo Moto* Writ Petition No.7 of 2001 was initiated when the High Court took note of press reports, clippings of which were submitted to the Court by villagers from the habitations on the banks of the River Kushavati, highlighting the threat to the river by indiscriminate washing of manganese ore on its banks.

River Kushavati is one of the main sweet water rivers in South Goa originating in Sanguem and passing through Quepem to finally join the River Zuari at Kelvona. The areas through which the river flows are mainly agricultural areas. The petitioners say that there are more than 500 pump sets installed with permission of the Water Resource Department for lifting river water for irrigating the fields and horticultural gardens along its banks. The State Government has also installed a lift irrigation scheme on this river at Kelvona.

The State Pollution Control Board's report admits that substantial quantity of manganese ore was seen scattered on the banks of the River Kushavati, either as residual fines, marketable lumps or rejects, all sites being right inside the agricultural land, plantations.

The SPCB identified the problem as being the indiscriminate washing of manganese ore on the bank of the river which leaves behind residue, which gets washed into the river during the washing process and also the monsoon.

No special machinery or plant is installed for washing the ore. Washing is carried out in portable mixers used for mixing concrete. The wash water emptied on the ground is allowed to find its own way into the river and the water required for washing is lifted from the river by pumps which were installed for purposes of irrigation. Despite the fact that the cost of manganese ore is so high that one truckload of good quality ore is valued at Rs 1 lakh, contractors prefer to use this crude process of washing the ore as it enables them to earn rich returns and pass on the cost to the environment.

The mining companies claim that the Indian Bureau of Mines officials regularly monitor their performance but in support of their statement, they could only display copies of Monitoring Reports prepared and submitted by them to the Indian Bureau of Mines.

In August 2001, the Court directed the State Government to take immediate steps to clear the dumps and to see that mining waste does not get

mixed with the flow of the Kushavati River. Costs for recovery of expenses for these works is yet to be fixed by the Court. The parties responsible for washing manganese ore on the banks of the river were also restrained from dumping iron ore rejects within 50 mts. of the banks of the river or its rivulets.

♦ *Transport of Hazardous Substances Chlorine*

The Public Liability Insurance Act, 1991 was applied for the first time in Goa in 1992 after a tanker carrying chlorine met with an accident at Chinchinim and discharged chlorine into the atmosphere. The chlorine caused damage to people and the environment. On 10.12.1992 the Collector made an award of Rs 38,927 in favour of the persons affected by the accident. The Collector held both the companies, namely M/s Ballarpur Industries, Karwar, who had made the ex-factory sales and M/s Hindustan Ciba Geigy who were to be the recipient of the consignment, as well as M/s Arif Transport Ltd. who were transporting the consignment as equally responsible to pay the compensation in equal proportion to the claimants.

♦ *Coal Dust Pollution in Mormugao*

The Goa Citizens Watchdog Association addressed a letter petition to the High Court complaining of the pollution caused by the transportation, loading, unloading and handling of coal and iron ore by Mormugao Port Trust which is affecting the citizens of Vasco town. In addition to the coal dust pollution, the petitioner also complained that the poisonous fumes emitted by three petroleum companies, Indian Oil Corporation, Hindustan Petroleum and Bharat Petroleum add to the air pollution which the citizens have to face on daily basis, without respite. The combined effect is highly deleterious to the health of the citizens of Vasco. The Court directed that the petition be styled as a *Suo Moto* PIL Writ Petition and issued notices to MPT and the petroleum companies.

The affidavits filed by IOC, HPL and BPL stated that while the companies do handle petroleum products such as petrol, naphtha, diesel, kerosene, etc. which are all received from various destinations by ocean containers at Mormugao harbour, these are pumped directly to the respective installations at Vasco through pipeline from the sea jetty and are stored in tanks (which have floating roofs) at the shore. The operations are totally controlled and there is no possibility of spillage or escape of petroleum/vapour. Hence the Court discharged these parties from the proceedings.

MPT has however been directed to give details of the measures it is taking and proposes to take to control the dust pollution. MPT's affidavit records

that during 1999-2000 MPT handled 15.5 million tonnes of iron ore, 0.14 million tonnes of alumina and 1.88 million tonnes of coal coke.

♦ *Ban on Fishing During Monsoon*

A letter petition addressed to the High Court in July 2000, praying for judicial intervention because Government of Goa had reduced the ban on monsoon fishing from 90 days (1st June to 31st August) to 54 days (1st June to 24th July), and that this decision (which was taken only to satisfy the greed of the trawlers owners having influence in the corridors of power) had caused ecological imbalance and vastly reduced fisheries was converted into a Writ Petition by the Goa Bench of the Bombay High Court.

Directions were issued to the State Government to file detailed affidavit giving all relevant information including the steps which can be taken to prevent mechanised fishing boats operating in the rivers and in the seas during the ban period.

The Court also directed the National Institute of Oceanography to inform the Court of the breeding season of fish found on the Goa coast and the period for which the ban should be imposed to protect the fish breeding grounds.

On perusal of the material brought on record and as an interim measure, the High Court directed that there will be a complete ban on mechanised fishing from 1st June till 15th August each year. When it was brought to the notice of the Court that the trawler owners were violating the interim orders, the Court banned the use of all 7 jetties for fishing purposes and suspended the licences of the trawlers during the period of the ban.

Application filed by the Government to modify the order in the light of the fact that Cabinet took a decision to ban monsoon fishing from 1st June to 31st July (an extension of 7 days on the earlier cut off date) was rejected by the Court. The period of the monsoon ban on mechanised fishing remains from 1st June to 15th August till the final hearing of this petition.

♦ *Saving Islands*

The Panjim Bench of the Bombay High Court on March 15, 1999, took cognizance of an article titled 'Mandovi's Islands in Peril' by Dr. Nandkumar Kamat, wherein it was stated that though the Goa Assembly had passed a resolution to conserve certain islands in the State, no steps had been taken.

The islands, identified as important from the point of natural heritage, were Chora, Capao, Jua, Divar and Cumbarjua. The Court directed that the said article be treated as a writ petition.

The judges expressed dissatisfaction that no effective steps were taken to tackle the problem of breached bunds on the islands, which have been disrupting normal life for several years.

Although the State Land Resources Management Committee had been constituted in October 1993, nothing had been done besides constituting the Committee.

The Bench therefore directed the Government to immediately identify all breaches in bunds in all the 5 islands and place a report before the Court, along with measures to be taken to fill the same at the earliest. The Director of Agriculture thereafter filed an affidavit stating that work on two major bunds which had been breached would be completed by June 15th, 1999.

The Court directed the Government to report to the Court with more details and measures undertaken and to be undertaken to tackle the problem.

♦ *Rehabilitation of Khazans*

Acting on a plea made by a citizen from Rachol in Salcete Taluka that inundation of *khazan* lands with saline water was causing environmental destruction of the fields, the High Court directed the Mamlatdars to take necessary action in accordance with the provisions of law.

The Salcete mamlatdar in whose jurisdiction there are over 28 *khazan* lands, the majority of them being inundated for pisciculture without permission in contravention of the provisions under Section 32 of the Goa Daman and Diu Land Revenue Code and Section 38 of the Goa Daman and Diu Agricultural Act, 1964, gave notice to all the *Khazan* Land Associations to drain out the saline water from the paddy fields within 24 hours of the receipt of the notice.

Despite the notice, no action has been taken in the matter and the *khazan* lands continue to be inundated with saline water. The Mamlatdar states that it is difficult to keep a check on the *khazan* sluice gates as the activities take place late at night. The Agriculture Minister has stated that inundation of the *khazan* lands is totally illegal, but due to political interference tenant associations have been violating the law with impunity.

♦ *Halting a 'Millennium Bash' on grounds of violating CRZ and Noise Regulations*

This event to be held at Anjuna Beach over 10 days, from 23rd December 1999 to 2nd January 2000, and widely advertised as being held on the third largest dance floor in Asia, drew the attention of the Court when a Writ Petition was filed by Peter D'Souza, a journalist, alleging that the promoters, Mr. Norman Azavedo and Mr. Jay Wadia had violated the CRZ Notification by the constructions raised at Paraiso de Anjuna and they would also violate the noise pollution control laws if the party were allowed to take place at the same venue. The advertisements announced non-stop, 24 hours, loud music during the 10 day period.

To host the party the promoters had made massive developments in the No Development Zone

of the CRZ. The promoters had scooped out portions of the beach area, cut down acacia trees which were specially grown under a Social Forestry scheme, cut steps into the hill and pitched tents all over the plot. Several permanent structures were constructed, like a huge dance floor and foundations for other structures.

The Court finding *prima facie* evidence of violation of the laws as alleged, stopped the party immediately. Subsequently, after examining the matter, the Court directed demolition of all the structures, which was carried out by the authorities.

However, two years later, the same area was reconstructed by Nandan Kuchadkar and once again, year-end revelries were held, albeit on a smaller scale, in December 2001. These structures were demolished for the second time by the Director of Tourism in the year 2002.

♦ *Protecting Tenanted Lands from Development*

On 1st July 2000, the Panjim Bench of the Bombay High Court comprising Justices F.I. Rebello and V.C. Daga issued Interim Orders in a writ petition filed in public interest on the subject of conversion of agricultural land to nonagricultural uses. The Court's interim order was meant to curb the widespread sale of tenanted land, which was being diverted away from agricultural to other uses, mainly commercial.

The Interim Order records that Goa Land Use (Regulation) Act, 1991 (in force from November 2, 1990), having been enacted so that lands used for agriculture, on which rights of ownership have been conferred on tenants as part of the agrarian reform, conversion of such lands for nonagricultural purposes cannot be permitted as this would defeat the very objective of the Land Use Act.

The Order also records that no civil court has the jurisdiction to decide or deal with any question which is required to be settled, decided or dealt with by the authorities under this Act and no order passed by these authorities can be called into question in a civil or criminal court. If therefore, there were any proceedings between landlord and tenant relating to rent, tenancy or purchase of land, the order of the civil court would be of no consequence as it would be an order without jurisdiction. Similarly, change in the survey records, even if on the basis of affidavits, would be fraudulent.

As the writ petition brought to the notice of the Court that there were several cases where land was transferred from the original owner/tenant to various parties for nonagricultural use, the Court held that *prima facie* such acts of change of use of land (unless they are bonafide) are a fraud on the Act.

The Court therefore directed the SDOs who are authorised to grant conversion certificates to

stay all constructions on such plots from 2.11.1990 and to review all cases of land conversion from 2.11.1990. The SDOs were also directed to take the assistance of Mamlatdars and Talathis and prepare reports on such lands which would indicate the areas where such land has been converted, whether there were proceedings by the landlord or tenant under the Tenancy Act and the crop production records of such lands.

All authorities under the Town & Country Planning Act were directed to issue orders to stop all ongoing constructions on such lands, and the Town & Country Planning Board was also directed not to consider any case for change of user of land in the Regional Plan or any other plan in respect of agricultural lands till further orders of the Court.

♦ *Mangor: Preservation of Open Spaces*

The Down Mangor Valley Residents Association (DMVRA) in Vasco approached the Court with a PIL concerning the loss of open space earmarked for the housing colony due to encroachments of hutments in the area.

The original owner of the plot had demarcated the area to be left as open space as per the requirements of the law, when he subdivided the land in 1978 and sold individual plots to the present owners of the properties. However, on account of construction activities in the area and other factors, over the years hutments gradually began to unauthorisedly occupy the open space.

DMVRA pursued the matter with the Mormugao Municipal Council and eventually show cause notice was issued by MMC to the hutment owners. This was followed by a Final Demolition Notice from MMC, which as per law must be followed by appropriate action from the MMC on the conclusion of expiry period of 15 days.

Instead, MMC later withdrew the Final Demolition notice. Apparently this was done under political pressure.

The Court in its judgement came down heavily on the Chief Officer of MMC and ruled that once a final demolition notice has been issued and the party had neither appealed the order nor complied with it, the MMC had no option but to implement its own order and carry out the demolition.

The Court directed demolition of the illegal hutments, which was carried out immediately thereafter and the DMVRA have got back the open space for the colony.

Nagzor: Remedying Water Shortages

A resident of Nagzor village in Pernem Taluka wrote a letter to the High Court regarding the difficulties that the villagers in this area were facing to procure water for drinking and for other domestic uses. The Court treated the letter as a PIL.

The Courts and Sand Dunes

It was inevitable that the protection of sand dunes would one day end up within the portals of the High Court and the Supreme Court. The course of judicial recognition of the importance of sand dunes has been an up-down course with highs and lows. Where judges have come from coastal areas and have physically understood and seen the importance of sand dunes, they have taken a severe view. Others, who have neither seen nor understood the importance, have been dismissive of their fate.

The first time the Courts took notice of sand dune ecology was in the early 80s during a petition filed by the Goa Foundation. During that time, the Goa Government, under protest from people in coastal areas, had taken a decision to cancel leases granted to several individuals to physically extract sand from the beaches. The lease holders challenged the action of the Government in the High Court. The Goa Foundation filed a petition demanding cancellation of all the leases. Eventually on 10/15.11.1989, the High Court upheld the orders of the Goa Government cancelling the leases and allowed the petition of the Goa Foundation. The Court in its judgement noted as follows:

'We cannot but emphasize that the mineral like silica-sand makes the dunes and beaches that have given distinctive dress to this territory. The gorgeous seas that skirt the shores of this region abound in this mineral wealth. But that is not merely an item for exploitation or expropriation. It also is an item needing preservation and protection. Sands herein offer a vital link to man standing between the sea and shore and a boundary of land from water. If not properly planned or wisely developed and allowed to be extracted, unmindful of its results, the very balance it maintains is likely to be affected leading to hazardous results to human growth. The unique and distinctive seafront not only makes the geography of this area bountiful, but surely beautiful. Aesthetics and economics are intermingled in a fine way in these fine sands. Climatic as well as ecological reasons exist as to why the mineral development

this side should be undertaken with total perspective and be well planned and its exploitation undertaken to enrich rather than impoverish this natural treasure. All these factors we hope will be kept in view by every authority concerned so as to preserve, protect and prospect to greater use, the basic natural wealth that is under their management.'

Even while the High Court was delivering its judgement, the Goa Government commenced granting permissions to five-star resorts, which were located in sand dune areas. The projects of the Ramada Renaissance and the Dalmia Resorts International were actually located on sand dunes. The Foundation thereafter filed fresh petitions requiring cancellation of such permissions as they were contrary to the ecology. In the Ramada case, the Court asked former Chief Town Planner, S.P. Deshpande, for an expert opinion on whether the constructions were damaging the sand dunes. Deshpande filed a report that no sand dunes should be touched in the area 200 m from the HTL as this was an ecologically sensitive area. The primary sand dune system was located in this area and it was absolutely necessary for it to be protected from development. Deshpande, however, took a lenient view of sand dunes beyond 200 m declaring them unimportant, and thus features that can be sacrificed for development purposes. This information may have something to do with the fact that Deshpande himself was already actively involved in the construction of hotels located between 200-500 m of the HTL, a fact which was not disclosed to the Court.

It was only when the Coastal Zone Management Plans of Goa and other coastal states were approved in September 1996 that sand dunes finally got the protection required as they were now classified as CRZ-I.

In the case of *Gulf Goans vs. the Union of India* and *Goa Foundation vs. Gulf Goans*, Justices Ferdincho Rebello and V.C. Daga delivered a detailed judgement upholding the provisions of the Environment Protection Act and actions taken by

the Central Government against several hotels that had violated guidelines and norms for the protection of beach areas. The judgement has a comprehensive section on sand dunes, their ecology and the need for their protection.

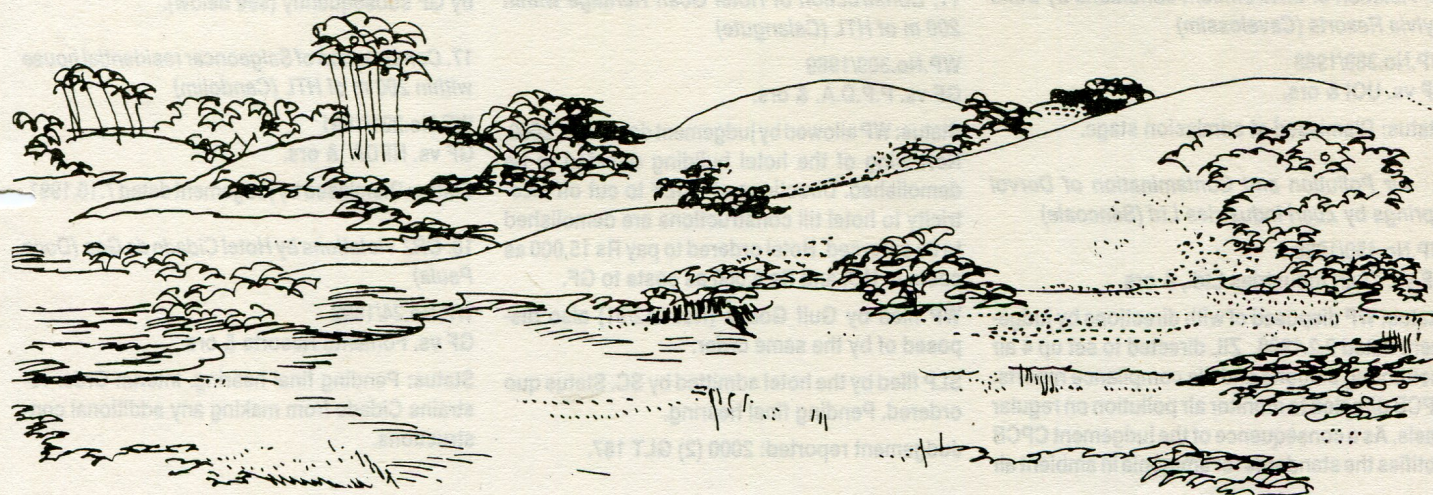
Thereafter, sand dunes have generated contradictory responses from both the High Court and the Supreme Court in the *Diksha Resort* matter. While at interim stages, one set of judges in the High Court and the Supreme Court blocked the construction of the Diksha Hotel on grounds that all sand dune areas are CRZ-I where no sanctions can be granted, another set of judges threw the petition out on the grounds that the sand dunes in question were too small to meet the status of sand dunes, and therefore ruled in favour of the construction of the hotel.

The Goa Foundation has filed an application for recall of the judgement in the *Diksha* matter on the grounds that the judgement is based on erroneous facts. The petition is pending hearing.

Sand dunes are also a major issue in the *Piva Resorts* petition where at interim stage, the High Court stayed construction of the project because it would destroy the largest sand dune at Baga beach. The Supreme court also upheld the interim order. However, the petition was dismissed by the Bombay High Court after a final hearing, but stay was allowed to continue giving the Foundation time to appeal to the Supreme Court. The Apex court has continued the stay pending admission of the appeal.

Unless the Supreme Court makes its decision on sand dunes crystal clear, their fate will continue to hang in the balance. Every time a sand dune is removed, society loses because the loss is irreplaceable and irreversible, as destructive in its impact as the removal of forests. But we have also come a long way. Now it is legally impossible to locate any further resorts on sand dunes or in sand dune areas. Public perception of their ecological importance has grown, not decreased.

Maybe they will continue to survive with us into the future.



List of Public Interest Litigation Cases Filed by Goa Foundation (1987-2002)

GOA FOUNDATION PUBLIC INTEREST PETITIONS IN THE HIGH COURT

(See abbreviations at the end of text)

1. *Extraction of Sand from Sand Dunes*

WP No.145/1987

GF vs. State of Goa & ors.

Status: WP allowed by judgement dated 10/15.11.1989. Sand extraction leases cancelled.

2. *Wrongful Constitution of the Goa SPCB*

WP No.218/1988

GF vs. State of Goa & ors

Status: Disposed of, as GOG agreed to change the Chairman of the Board.

3. *Violation of Environment conditions by Ramada Renaissance (Varca)*

WP. No.367/1988

Sergio Carvalho vs. State of Goa & ors

GF WP against Ramada (WP No.349/1988) was treated as heard by the Court since GF was actively involved in arguments placed by senior counsel in this WP.

Status: WP dismissed on 8.12.88 with directions. Court upheld UOI policy of ban on constructions within 200 m of HTL. Ramada gave undertaking to remove the constructions within 200 m of HTL within three days.

Judgement reported: 1989 (1) GLT 276.

4. *Violation of Environment conditions by Dalmia Resorts (Cavelossim)*

WP.No.349/1988

GF vs. State of Goa & ors.

Status: WP allowed by judgement dated 13.7.2000. MoEF permitted to pursue directions issued under S.5 of EPA. Costs of Rs 15,000 awarded to UOI & Rs 15,000 to GF.

WP filed by GTC Industries (No.72/91) also disposed of by the same order.

SLP filed by Dalmia admitted by SC. Status quo ordered. Pending final hearing.

5. *Violation of Environment conditions by Dona Sylvia Resorts (Cavelossim)*

WP.No.389/1988

GF vs. UOI & ors.

Status: Dismissed at admission stage.

6. *Air Pollution and Contamination of Dorvol Springs by Zuari Industries Ltd (Sancoale)*

WP.No.450/1988

GF vs. Zuari Industries Ltd., & ors.

Status: WP disposed of with directions by judgement dated 2.2.1998. ZIL directed to set up 4 air monitoring stations and file compliance reports. SPCB directed to monitor air pollution on regular basis. As a consequence of the judgement CPCB notifies the standards for ammonia in ambient air

for the entire country, BARC investigates water pollution at Dorvol springs and GOG prepares Off-site Emergency Plan for South Goa.

7. *Construction of Taj Holiday Village within 200 m of HTL (Sinquerim)*

WP.No.25/1989

GF vs. State of Goa & ors.

Status: Pending final hearing. Interim Order restrains further constructions in 200 m zone.

8. *Land use changes in the Regional Plan for Goa permitting development upto 90 m of HTL*

WP.No.29/1989

GF vs. State of Goa

Status: WP dismissed.

9. *Construction of Majorda Beach Resort within 200 m of HTL (Majorda)*

WP.No.47/1989

GF vs. State of Goa & ors.

Status: WP allowed by judgement dated 13.7.2000. Phase II of the hotel building involving 46 rooms to be demolished. Hotel filed affidavit that Phase III would not be constructed. Directions of MoEF to cut off electricity to hotel till constructions are demolished to be enforced. Hotel ordered to pay Rs 15,000 as costs to UOI and Rs 15,000 as costs to the GF.

WP filed by Majorda (No.64/92) also disposed of by the same order.

SLP filed by Majorda admitted by SC. Status quo ordered. Pending final hearing.

10. *Chlorine Gas disaster (Cortalim)*

WP.No.72/1989

GF & residents of Cortalim vs. State of Goa & ors.

Status: Disposed of by judgement dated 8.2.2000 which directed the GOG to consider the claims of the victims for compensation. The Court took the view it could not consider compensation itself.

Judgement reported: 2000 (1) GLT 228.

11. *Construction of Hotel Goan Heritage within 200 m of HTL (Calangute)*

WP.No.309/1989

GF vs. P.P.D.A. & ors.

Status: WP allowed by judgement dated 13.7.2000. New wing of the hotel building directed to be demolished. Directions of MoEF to cut off electricity to hotel till constructions are demolished to be enforced. Hotel ordered to pay Rs 15,000 as costs to UOI and Rs 5,000 as costs to GF.

WP filed by Gulf Goans (No. 212/91) also disposed of by the same order.

SLP filed by the hotel admitted by SC. Status quo ordered. Pending final hearing.

Judgement reported: 2000 (2) GLT 187.

12. *Tourism department constructions within 200 m of htl (Calangute)*

WP.No.399/1989

GF vs. Dept. of Tourism & ors.

Status: WP dismissed by order dated 21.12.89. SLP dismissed.

13. *Land use changes in Regional Plan favouring Leela Beach Resort (Mobor)*

WP.No.400/1989

GF vs. Chief Town Planner & ors.

Status: WP dismissed.

14. *Violation of environment clearance by Leela Beach Resort (Mobor)*

WP.No.225/1990

GF vs. Leela Venture & ors.

Status: WP partly allowed by Judgement dated 6.10.2001. Leela directed to pay fine of Rs 1 lakh. Earlier in 1991, Leela Beach had been directed to demolish constructions within 200 m of HTL, close wells within 500 m of HTL and fill up the unauthorised lagoon.

15. *For directions to Planning Authorities on 'Right to Know' documents*

WP.No.214/1991

GF vs. SGPDA & ors.

Status: Disposed of by judgement dated 7.1.1998. Interim orders directed authorities to grant petitioner inspection of required documents. As GOG has brought the Goa Right to Information Act, 1997, into force, the reliefs sought by GF are already met.

16. *Violation of Environment norms by Hospitality Resorts (Utorda)*

WP.No.215/1991

GF vs. SGPDA & ors.

Status: GOG directed to take decision on alleged environment violations and communicate the same to petitioner. WP allowed to be withdrawn with liberty to file again if decision is not acceptable to the petitioner. Fresh WP No.473/97 filed by GF subsequently (see below).

17. *Construction of Salgaoncar residential house within 200 m of HTL (Candolim)*

WP.No.221/1991

GF vs. NPDA & ors.

Status: Dismissed by judgement dated 7.10.1991

18. *CRZ Violations by Hotel Cidade de Goa (Dona Paula)*

WP.No.24/1992

GF vs. Fomento Resorts & ors.

Status: Pending final hearing. Interim Order restrains Cidade from making any additional constructions.

19. Violation of Land Acquisition Agreement by Cidade de Goa (Dona Paula)

WP.No.36/1992

GF vs. Fomento Resorts & ors.

Status: WP allowed by judgement dated 25.4.2000. Court directs public access through hotel property to be opened by hotel. Constructions on plot ordered to be demolished and proceedings for resumption of land to be initiated by GOG. Costs to be paid to petitioners.

SLP filed by Cidade admitted by SC. Status quo directed on demolitions and resumption of land. Pending final hearing.

Judgement reported: 2000 (2) Goa L.T. 49

20. Privatisation of beach by Cidade de Goa (Dona Paula)

WP.No.37/1992

GF vs. Fomento Resorts & ors.

Status: Disposed of with directions by judgement dated 25.4.2000. Cidade directed to maintain proper access for the public.

SLP filed by GF admitted by the SC. Pending final hearing.

21. Violation of CRZ Notification by Beach Ark Hotel (Fatrade)

WP.No.76/1992

Beach Ark Hotels vs. UOI & ors.

GF - Intervenor.

Status: Disposed of by judgement dated 22.4.1992. Beach Ark undertakes to demolish fencing within 15 days and close down basement permanently within one year.

22. For Directions to the Statutory Authorities to take air and water samples on receipt of complaints from citizens under EPA.

WP.No.94/1992

GF vs. Chief Inspector of Factories & ors.

Status: WP allowed by judgement dated 4.5.2000. Court held that it is incumbent on the authorities to monitor a matter once notice under EPA is received and to furnish relevant reports to citizens who have complained of pollution under the relevant pollution control Acts.

Judgement reported: 2000 (2) Goa L.T. 113

23. Construction of beneficiation plant by Chowgule Co. in forest area (Sanguem)

WP.No.113 /1992

GF and Peaceful Society vs. State of Goa & ors.

Status: WP allowed by judgement dated 21.7.2000. GOG directed to restore the land to original status. Court held that the lease granted to Chowgule Co. by GOG is 'stillborn, null and void.' Interim order had restrained further development on the plot.

Judgement reported: 2000 (2) GLT 386.

SLP filed by Chowgule Co. admitted by SC. Status quo ordered. Pending final hearing.

24. Implementation of Goa Coastal Zone Management Plan

WP.No.115/1992

GF vs. GSCE & ors.

Status: WP disposed of by judgement dated 15.7.98 after the Advocate General informed the Court that GOG is following the approved CZMP.

Judgement reported: 1998 (2) GLT 348.

25. Konkarn Railway Alignment in Goa

GF vs. Konkarn Railway Corporation and ors.

Status: WP dismissed on 29.4.1992. Court held that environment clearance under the EPA is not required in view of Section 11 of the Railways Act, 1989.

Judgement reported: AIR 1992 BOMBAY 471.

26. Violation of CRZ Notification by Kenil Worth Resorts (Hospitality Resorts at Utorda)

WP.No.473/1992

GF vs. SPDA & ors.

Status: Pending final hearing. Interim order directed Resort to open up public access, close the wells in 200 m zone and maintain status quo.

27. Constructions of Garth de Souza within 200 m of the HTL (Cavelossim)

WP.No.507/1992

GF vs. State of Goa & ors.

Status: Disposed of by Order dated 23-10-2001 directing the GCZMA to examine the violations and take necessary action. Interim order directing status quo and restraint on issue of bar license to continue.

28. Felling of 219 trees by Marriott Resort (Miramar)

WP.No.331/1993

GF vs. The Tree Officer & ors.

Status: Pending final hearing.

29. Approval of nonexistent road by Town Planning Board to facilitate construction of Marriott Resort (Miramar)

WP.No.332/1993

GF vs. Goa Town & Country Planning Board & ors.

Status: Pending final hearing.

30. Construction of Marriott Resort in violation of CRZ Notification

WP.No.333/1993

GF vs. N.G.P.D.A., & ors.

Status: Pending final hearing.

Interim order reported: 1995 (1) GLT 181.

31. Construction of Marriott Resort in violation of Ports Act

WP.No.391/1993

GF vs. Captain of Ports & ors.

Status: Pending final hearing.

32. Fraud in preparation of EIA for Konkarn Railway

WP.No.633/1993

GF vs. Railway Board & ors.

Status: WP dismissed as withdrawn by order dated 24.7.1995. Court declined to examine the EIA at the instance of a stranger to the contract between KRC and RITES.

33. Thapar Du Pont Project approval in violation of Panchayati Raj Act (Querim)

WP. No. 16/1995

GF & residents of Querim vs. Panchayat of Querim, and ors

Status: Allowed to be withdrawn by order dated 28.2.1995 as the Panchayat passed Resolution against the project and TDL had to leave Querim.

34. Land Acquisition for Thapar Du Pont Project (Querim)

WP. No.18/1995

GF & residents of Querim vs. State of Goa & ors

Status: Allowed to be withdrawn by order dated 30.3.1995 as the Panchayat passed Resolution against the project and TDL had to leave Querim.

35. Environment impact of Thapar Du Pont Project (Querim)

WP. No. 19/1995

GF & residents of Querim vs. State of Goa, & ors.

Status: Allowed to be withdrawn by order dated 30.3.1995 as the Panchayat passed Resolution against the project and TDL had to leave Querim.

36. Violation of Panchayati Raj Act by Binani Glass Fibre (Colvale)

WP.No. 178/1995

GF & residents of Colvale vs. Panchayat of Colvale

Status: WP disposed of by judgement dated 10.7.1995. Director of Panchayats quashed the demolition order of the Panchayat of Colvale.

37. Goa Housing Board Constructions in Pilerne Forest (Pilerne)

WP. No.368/1995

GF, Peaceful Society, Nirmal Vishwa, vs. Goa Housing Board & ors.

Status: WP allowed by Judgement dated 22.1.1996. Construction prohibited.

38. HTL of Surveyor General of India in violation of CRZ Notification

WP. No.102/1996

GF vs. State of Goa & ors.

Status: WP allowed by judgement dated 3/ 4.7.2000. GOG decision accepting the Surveyor General of India's High Tide Line from Velsao to Cavelossim is quashed.

SLP filed by GOG admitted by SC. Pending final hearing. Judgement reported: 2000 (2) GLT 174

39. Illegal construction in 200m Zone (Calangute & Candolim)

WP. No.126/1996

GF vs. State of Goa, & ors.

Status: WP allowed by judgement dated 29.6.2000. Court directed that scheme submitted by the GOG which includes weekly patrolling of CRZ areas be strictly adhered to in order to monitor constructions within CRZ areas. Action on violations of CRZ to be taken by GCZMA. Panchayats of Candolim and Calangute directed to pay Rs 15,000 each to the GF as costs.

Judgement reported: 2000 (2) GLT 280.

40. Destruction of Sand Dunes by Piva Resorts (Baga)

WP. No.319/1996

GF vs. GSCE & ors.

Status: WP dismissed by judgement dated 20.12.2000. However, Interim stay of project to continue to enable GF to appeal the judgement.

SLP filed by GF admitted by SC. Status quo directed. Pending final hearing.

Interim order reported: 1998 (1) GLT 364;

Judgement reported: 2000 (1) GLT 6.

41. Water Pollution by Penguin Alcohols (Shristal)

WP. No.373/1996

GF & residents of Shristal vs. SPCB & ors.

Status: Disposed of by order dated 4.11.1996. SPCB shut down the Penguin Alcohols company.

42. CRZ violation by Dolphin Adventure Sports (Dona Paula)

WP. No.385/1996

GF & residents of Dona Paula vs. Dolphin Adventure Sports Ltd., & ors.

Status: Disposed off by judgement dated 21.7.97. All construction activities stayed until the project receives permissions from the authorities.

43. Advertising of liquor despite statutory ban

WP. No.49/1997

GF vs. Commissioner of Excise & ors.

Status: WP disposed of by order dated 28.2.2001. GOG informed the Court that it was withdrawing the controversial notification which permitted advertising of liquor on special occasions.

44. Power Purchase Agreement of Reliance Salgaoncar Power Plant (Mormugao)

WP. No.63/1997

Dr. J.C. Almeida vs. State of Goa & ors.

GF -Intervenor

Status: WP dismissed by judgement dated 12.2.1998.

45. Environmental Impact of Mining by Dhempo Mining Corporation (Bicholim)

WP. No.109/1997

GF & residents of Bicholim vs. State of Goa

Status: Pending final hearing.

46. TATA housing project construction in forest land (Betim)

WP. No.273/1997

GF & Nirmal Vishwa vs. Conservator of Forests & ors.

Status: WP allowed by judgement dated 16.10.98. All permissions quashed. Tatas directed to remove the constructions erected and restore the forest to its original condition.

SLP filed by Tata Company admitted by SC. Status quo directed.

Judgement reported: 1999 (1) GLT 1.

47. Environment problems created by Asiatic Resorts (Calangute)

WP. No.349/1997

GF & residents of Calangute vs. Panchayat of Calangute & ors.

Status: Pending final hearing. Court has shut down the entire project by its Interim Order. SC has upheld Interim order.

Order reported: 1998 (1) GLT 28 (Interim order); 1998 (1) GLT 1 (SC order).

48. Destruction of agriculture by Konkan Railway Corporation (Mayem)

WP.No. 221/1997

Donxi Khazan Tenants Association Naroa vs. Konkan Railway Corporation

Status: WP disposed of. KRC filed a statement giving list of works that it would undertake to relieve villagers of difficulties encountered due to embankments constructed at Tikhazan, Mayem. WP drawn by the legal cell of GF.

49. Construction of Railway siding for Zuari Industries (Sancoale)

WP. No.124/1998

Anti Pollution Citizens Committee & GF vs. State of Goa & ors.

Status: Dismissed by order dated 15.6.1998.

50. Illegal Constructions within 200m of HTL at Palolem Beach (Palolem)

WP. No.150/1998

GF & residents of Palolem vs. Canacona Municipal Council & ors.

Status: WP allowed by judgement dated 18.7.1998. Court directed demolition of all constructions erected in violation of the CRZ notification. SLP filed by the respondents against order of demolition dismissed by SC.

Judgement reported: 1998(2) Goa L.T. 326

51. Illegal Constructions within 200m of HTL at Colva Beach (Colva)

Suo Moto WP No.418/98

vs. Village Panchayat of Colva & ors. GF - Intervenor.

Status: Disposed of by order dated 7.2.2001. Order records that government authorities are seized of the matter.

52. Construction of Diksha Resort on Sand Dunes (Canacona)

WP No.427/98

GF vs. Diksha Holdings & ors.

Status: WP transferred to Mumbai for hearing and dismissed by the Bombay High Court by judgement dated 8.10.1999.

SLP filed by GF admitted and stay granted. Dismissed by the SC by its judgement dated 10.11.2000. Appellant (GF) has filed an application for recall of the judgement on the ground that the SC has erred seriously on facts that are part of its record.

Orders/judgements reported: 1999 (1) GLT 298 (Interim order); 2000 (1) GLT 186 (High Court judgement in WP. No.4594/99 renumbered); 2000 (1) GLT 224 (SC interim order in GF appeal); 2001 (1) GLT 303 (SC judgement dismissing GF appeal).

53. United Breweries Guest House in violation of CRZ Notification (Candolim)

WP No.414/98

GF vs. United Breweries & ors.

Status: WP dismissed by Judgement dated 11.7.2001. UB is permitted to carry out the construction subject to further orders of the Court. UB Company affidavit states that Guest House is the Chairman's personal residence.

Orders/Judgement reported: 1999(1) Goa L.T. 193 (Interim Order); 2001(2) GLT 162 (High Court judgement)

54. Construction of Teksid Kalyani Foundry without Environment Clearance ((Bicholim)

WP No.420/1998

GF vs. Teksid Kalyani Iron Foundry Ltd., & ors.

Status: WP disposed of by order dated 29.1.1999. Order records that Company will not make any constructions till it has obtained environment clearance under EIA Notification.

Judgement reported: 1999(1) Goa L.T. 321

55. Constructions in Candolim in excess of quota permitted under CRZ Notification (Candolim)

WP No.422/1998

GF vs. Panchayat of Candolim & ors.

Status: WP admitted on 6.5.1999. Interim order records that no further approvals will be granted in the CRZ of the entire state of Goa for residential purposes till WP is disposed. WP is pending final hearing.

Order reported: 1999(2) Goa L.T. 330.

56. Noise Pollution by Brisa Resorts (Calangute)

WP No.364/98

Little Flower of Jesus School & GF vs. Brisa Leisure Resorts & ors.

Status: Dismissed at admission stage on 13.10.98. SLP against order filed in the SC disposed of recording that all issues are still open.

57. Protection of beaches from Food Festivals and maintenance of cleanliness

WP No.55/99

People's Movement for Civic Action & GF vs. Dept of Tourism & ors.

Status: WP disposed of by order dated 14.2.2001. Order records Government policy not to permit food festivals on the beaches and GOG scheme for keeping the beaches clean.

58. *Construction in Candolim in excess of quota permitted under CRZ Notification (Calangute)*

WP No.99/1999

GF vs. Panchayat of Calangute and ors.

Status: Pending final hearing. Same order as WP 422/98. WPs tagged together.

Order reported: 1999(2) Goa L.T. 330

59. *Garbage Disposal arrangements by Municipalities and Panchayats in Goa*

Suo Moto WP.No.109/99

vs. Chief Officer, Margao and ors.

GF and three other NGOs – Intervenor.

Status: Disposed of by Order dated 7.1.2001 as GOG informed the Court that it will take appropriate steps for disposal of garbage in accordance with the new Municipal Solid Waste Disposal Rules and Regulations of UOI.

60. *Dust Pollution from Mining Activities (Curchorem)*

WP No.123/99

GF & residents of Curchorem vs. Curchorem-Cacora Municipal Council & ors.

Status: Ad-interim relief directed truck owners to cover their trucks with tarpaulin and have the ore watered in the wagons prior to unloading. Chief Secretary submitted status report as directed by Court. South Central Railways directed to set up water sprinkling system as designed by RITES. WP pending final hearing.

61. *Challenge to Golden Peace Hotel in Forest Area (Penha de Franca)*

WP No.136/99

GF vs. Deputy Collector & ors.

Status: Disposed of by order dated 13.7.2000. Liberty given to petitioner to file appropriate petition regarding demarcation of forest lands.

62. *Construction of Maharani Guest House within 200m of HTL (Utorda)*

WP. No.265/99

GF vs. Maharani Guest House & ors.

Status: Pending final hearing. Interim order directing sealing of premises vacated by SC.

63. *Construction of Kamal Morarka within 200m of HTL (Calangute)*

WP No.204/99

GF vs. M.M. Caculo & ors.

Status: Construction stayed. WP disposed of by order dated 10.1.2000 as the 'issue is now squarely within the province of the National Coastal Zone Management Authority by virtue of their powers

of review.' NCZMA directs demolition of portion of building falling within 200m zone.

Judgement reported: 2000 (1) Goa L.T. 130

64. *Unauthorised Aquaculture Farm violating CRZ Notification (Tuem)*

WP.No.302/99

Tuem Nagrik Samiti and GF vs. Village Panchayat of Tuem & ors.

Status: WP disposed of by Order dated 11.1.2000 directing that no fresh stocking of the aquafarm will be done till Aquaculture Authority issues appropriate orders.

Judgement reported: 2000 (1) Goa L.T. 127

65. *Noise Pollution in Goa*

WP.No.366/99

Goa Environment Federation vs. State of Goa and ors.

Status: Interim order dated 18.1.2000 stopped all open-air night functions using amplified sound systems, beyond 10 pm. Government filed Scheme for Implementation of Noise Pollution Rules. WP pending final hearing. WP drawn by legal cell of GF.

Interim Order reported: 2000 (1) GLT 225.

66. *Appointment of Arecio D'Souza as Chairman of the SPCB violates Pollution Control Acts*

WP.No.384/99

GF vs. Arecio D'Souza and ors

Status: Interim order dated 18.1.2000 restrains Arecio D'Souza from participating in meetings or taking decision with regard to any major subject which comes before the SPCB. WP pending final hearing.

67. *Consent orders of SPCB relating to Meta Strips Factory (Sancoale)*

WP.No.196/2000

GF vs. State of Goa and ors.

Status: Pending final hearing.

68. *Illegal Construction of Residential Bungalow Affecting Water Springs (Assagao)*

WP.No.228/2000

GF and Desmond Alvares vs. State of Goa & ors.

Status: Disposed of by judgement dated 26.2.2001. Construction stayed by authorities.

69. *Appointments of SPCB members violating Pollution Control Statutes*

WP.No.309/2000

GF vs. State of Goa and ors.

Status: WP pending final hearing.

70. *Mining Operations in Area Declared as Forest (Sanguem)*

WP. No.103/2001

GF & ors vs. State of Goa and ors.

Status: WP pending final hearing. GOG directed to decide on mining lease application within 3

months.

71. *Construction on Hill Slopes (Panjim)*

WP. No.257/2001

People's Movement for Civic Action & GF vs. NGPDA & ors.

Status: Interim stay on all construction activity on the plots. WP pending final hearing.

72. *Noise Pollution by Mining Companies at Digas-Panchwadi (Ponda)*

WP. No.76/2002

GF and Residents of Digas v/s District Magistrate & ors.

Status: Pending admission

IN THE SUPREME COURT

(The following WPs were filed directly in SC)

73. *For Implementation of CRZ Notification*

WP No 664/1993

Indian Council For Enviro-Legal Action vs.UOI
GF – Intervenor

Status: WP allowed on 18-4-1996. Judgement upholds validity of CRZ/Notification and directs full compliance with all its provisions. SC struck down amendments which sought to dilute the Notification. CZMPs of all coastal states finalized and approved.

Judgement reported: JT 1996(4) SC 263

74. *Aquaculture in violation of CRZ*

WP No.561/1994

S. Jagannathan vs. UOI

GF - Intervenor

Status: Review petition admitted. GF files criticism of EIA report of Aquaculture Authority of India.

75. *Private Forests in Goa*

WP No.181 of 2001

GF v/s Conservator of Forests & ors

Status: State Government restrained from interfering in any manner with the Sawant Committee Report on private forests in Goa.

Abbreviations:

EPA	- Environment Protection Act, 1986
GOG	- Government of Goa
GF	- Goa Foundation
GSCE	- Goa State Committee on Environment
GCZMA	- Goa Coastal Zone Management Authority
HTL	- High Tide Line
MoEF	- Ministry of Environment and Forests
PDA	- Planning and Devp. Authority
SC	- Supreme Court
SLP	- Special Leave Petition
SPCB	- State Pollution Control Board
WP	- Writ Petition
UOI	- Union of India

Goa's Green Lawyers

The question in many people's minds is where does the Goa Foundation find the funds to fight its legal cases in the High Court and the Supreme Court. Every one with experience of the Courts and of the fees charged by present day lawyers knows about the suicidal costs of litigation and legal fees.

The answer to the question is fairly simple: the Foundation relies upon counsel and lawyers who are themselves committed environmentalists and who have therefore declined to charge the organisation any fees. We have the opportunity here to record the appreciation of Goans, whether here or abroad, of environmentalists, and of the rest of civil society, to the three outstanding lawyers who—between themselves—have fought almost all the environment cases involving Goa's environment both at the level of the High Court and the Supreme Court.

Senior Counsel Indira Jaising's role in the history of public interest litigation relating to Goa's environment was as pioneering as it was crucial. She fought the Ramada case before the Panjim bench in 1988. The judgement in that petition decided several issues involving constructions in coastal areas and had far-reaching consequences. After Ramada, height restrictions all over the coastal belt of India (a stretch of 6,000 kms) were forever frozen within 9 metres upto the highest ridge of the roof. The 200-metre zone from the HTL became sacrosanct. Ramada Renaissance was made to demolish all constructions raised by it, including wells, in the 200 metre zone.

Before the Goa Bench, Jaising argued GF petitions dealing with environmental violations by Taj Holiday Village, Goa Marriott (Palm Hotels), Dalmia Resorts, Majorda Beach Resort and other hotels. In the Supreme Court, Jaising has handled practically all the appeals filed by GF or cases in which GF is a respondent in an appeal. These include appeals filed by Cidade de Goa, Meta Strips, Diksha Holdings and Piva Resorts, among others. Every one of these cases has dealt with totally new issues and concerns and Jaising has

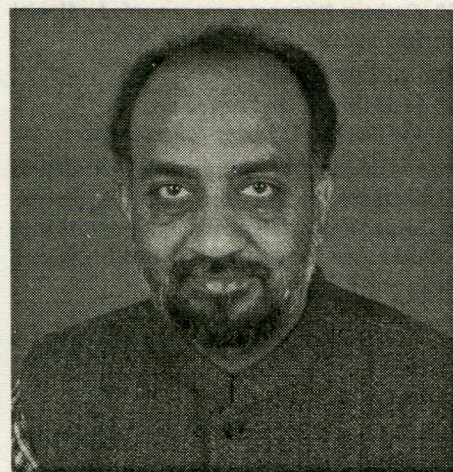
brought to all of them an amazing grasp of the facts of each case, the environmental issues raised, always respecting the spirit that drove the GF to file the cases while she argued the GF brief in the Supreme Court. All the world agrees that there is simply no match for Indira Jaising. The GF (and Goa) have always been fortunate that they have been represented in the Supreme Court by one of the country's most outstanding, probably the most outstanding, lawyer of the day.

After Ms Jaising moved to Delhi to argue full-time before the Supreme Court, her place in GF's matters before the Bombay High Court was taken over by Adv. Norma Alvares who joined the bar in 1990. Adv. Alvares has, in her turn, fought every major environment issue agitated before the High Court over the past decade. Her outstanding successes include an order for demolition of the Tata Housing constructions at Betim, the demolitions of considerable portions of the Goan Heritage and the Majorda Beach Resort, the cancellation of the lease granted to Chowgules in the Sanguem forest, banning of food festivals on beaches, control of dust pollution at Sanvordem-Curchorem, curbing noise pollution in Goa and several others. (Adv. Alvares also successfully petitioned the Court on bullfights and dog shooting: for her work relating to furthering animal

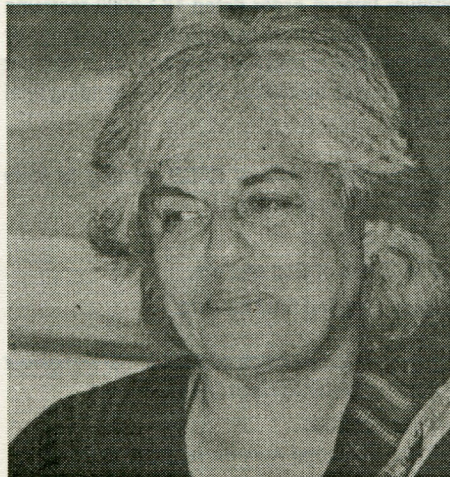
human rights lawyer. It is a wonder, in fact, that there are still professionals like him surviving in the legal fraternity whom social and environmental activists can turn to in times of need.

If any of these three lawyers had appeared for the other side, against the Goa Foundation, to defend environment wrongs and environment abuse, it is certain they would all have made a considerable pile. However, unlike most lawyers, all three GF counsel will not take up cases of persons or companies involved in human rights and environment law violations. All three

Supreme Court Adv. Sanjay Parikh



Senior Counsel Indira Jaising



individuals follow the routines of a simple life, finding greater happiness in the work they do than in the fees it gets them.

Ms Jaising, for example, edits and publishes *The Lawyers*, a popular law journal that keeps lawyers and lay persons abreast of significant developments in the courts and the country's judicial system. She also wrote *Justice for Women*, an important collection of essays relating to the emancipation of women. She has been associated with several landmark judgements of the Supreme Court including the Mary Roy case, the case involving pavement dwellers, the Ramada resort case, the Bajaj complaint against DIG Gill, and several others too numerous to mention.

Adv. Alvares is actively involved with People for Animals-Goa, of which she is the President. She is also legal adviser to the Other India Press, India's largest alternative publishing house. Sanjay Parikh, who is a devotee of Sri Aurobindo and the Mother, and was also a yoga teacher, remains one of the few advocates who make themselves available to public spirited citizen for raising issues of human and social rights in the Apex Court.

To the three of them, the Goa Foundation and the people of Goa say an unabashed *Dev Borem Korum* (God Bless). None of us will ever forget what you three people have done for the environment of Goa.

High Court Adv. Norma Alvares



rights jurisprudence, she was awarded the Padma Shri by the President of India on 26th January, 2002.) The Government of Goa also bestowed on her the Yashadhamini Puraskar in recognition of her outstanding work in environment law.

Adv. Sanjay Parikh is not only advocate on record for the Goa Foundation in several appeals before the Supreme Court; he also handles petitions filed by the Foundation directly in the apex court. The most recent of these cases has involved a petition to stay the work of the Karapurkar Committee on identification of private forests. Adv. Parikh has also represented the Foundation in the aquaculture and CRZ petitions. Adv. Parikh is a dedicated and committed environment and

Environment NGOs in Goa

Goan society has always responded strongly to environmental crises. It is important to recall that Goa is the only place where a giant fertilizer factory (the Zuari Agro Chemicals) was shut down because of pollution in 1974.

A few years later, an injunction was also granted against the Sanjivani sugar factory on the Ponda-Molem highway, restraining it from allowing its molasses to enter the public water supply.

A bigger victory came in 1994, when Thapar Du Pont finally gave up its project to produce Nylon 6,6 at Ponda and packed its bags.

A number of environment groups and village action committees have established themselves over the years. With meagre resources, they have maintained a watch over the Goan environment, frequently approaching the courts for intervention or taking to the streets when authorities connived with polluters or environmental offenders.

New groups have emerged over the last couple of years.

This is a heartening sign.

While Mother Nature often takes her own actions to bring about ecological balance, she welcomes the assistance of every environmental group, every individual, every girl and boy, to restore the health of the planet.

Goa's environment groups are an asset to the ecological resources of the state.

While we have made every effort to cover all environmental groups in Goa in these pages, we are aware that this is not a totally comprehensive list. While some groups did not respond to our requests for information, we are likely to have missed out some groups altogether. Our apologies for this.

Green Cross volunteers teach children how to handle snakes



♦ GREEN CROSS

Contact: Nirmal U. Kulkarni, President,
6 Hiru Naik Bldg., Dhuler,
Mapusa, Goa - 403 507.
email: greencross81@hotmail.com

Started in 1994, The Green Cross was registered in 1999 and is today one of Goa's most active field level wildlife groups. Since its inception it has

- conducted over 150 snake awareness and wildlife talks in schools, colleges, clubs, villages, gatherings, etc.

- rescued hundreds of animals and birds which were injured, mutilated, captive, etc. and rehabilitated the same in wildlife habitats.

- initiated the Galgibaga Turtle Nesting Project in coordination with the Forest Department, Southern Birdwing and the locals of the area.

- operates Goa's only 24 hour Wildlife ambulance-cum-patrol vehicle, supported by the Ministry of Social Justice and Empowerment, Government of Goa.

- provides volunteers to the Forest Department and other NGOs for wildlife censuses, workshops, treks, talks and slide shows.

- operates a 24 hour Snake Squad, rescuing snakes and other reptiles free of cost in the state and rehabilitating them in the wild.

- records, photo-documents and studies reptilian biodiversity of Goa and creates awareness about this biodiversity among the people of the state.

- is involved in the information collection, patrolling and curbing of wildlife trade, timber trade and poaching in coordination with the Forest Department of Goa.

Green Cross was awarded the Wildlife Service award for the year 2001 by the Forest Department, and the Goa Sudharop Award for 2001.

♦ PEOPLE'S MOVEMENT FOR CIVIC ACTION (PMCA)

Contact: Capt. Leo Lobo, General Secretary,
E-74, Campal, Panjim, Goa - 403001.
Phones: 223404; 225493. Fax: 228538
email: wellplumb@satyam.net.in

PMCA was set up in 1997 to tackle civic problems in Panjim. Over this period, PMCA has distinguished itself as one of the most active and effective citizens' groups in Goa.

The organisation was started in response to an ill-conceived Government plan to rehabilitate hawkers, whom it had itself arbitrarily evicted, at a site opposite the National Institute of Oceanography, Dona Paula. Over the years, PMCA has been involved in a wide variety of issues, ranging from keeping Miramar beach clean, to reducing plastic litter and garbage, to saving trees in the city. It has been very actively involved in efforts to bring some sense to the chaos and infamy that passes under the name of city-planning in Panjim city.

After the infamous 'Food Festival', PMCA was at the forefront of the effort to get the Miramar beach cleaned up and to ensure that no other such destructive festivals are organised there in future. PMCA took active part in Goa Environment Federation's 'Plastic-Free Goa Campaign'. Further, the PMCA has been instrumental in setting up a scheme in which prisoners in Aguada jail are offered a couple of days remission in their sentence for every thousand paper bags made by them.

PMCA has set up Citizens' Ward Committees in the Panjim Municipal area. Recently, it also convened meetings of the Citizens' Ward Committees to share their experiences and figure out ways of tackling civic and environmental problems. It has organised a successful house-to-house garbage collection project in Dona Paula. Garbage is collected only after segregation: plastic is handed over to the PMC once every fifteen days.

PMCA took strong exception when mangroves were being filled in near Panjim, to make way for an entertainment cum shopping centre. It participated with gusto in the public hearings relating to the Miramar Beach Management Plan and also organised several meetings and discussions on the project. Recently, PMCA was instrumental in bringing together tree-lovers from all over Goa for a large demonstration against the government's decision to cut down 36 beautiful rain trees (and other species) for purposes of widening the Campal-Miramar city road.

♦ VIVEKANAND ENVIRONMENT AWARENESS BRIGADE

Contact: Rajendra Kerkar
At Post: Keri,
Taluka Sattari - 403 505, Goa.
Tel: 369224
email: rpkerkar@yahoo.com

The Vivekanand Environment Awareness Brigade (VEAB) was started in November 2000 by the Swami Vivekanand Smruti Sangh which is based in Keri-Sattari. The Sangh works in the field of environment conservation and environment education with its focus on the youth.

In order to achieve these goals, the VEAB organises nature orientation camps in the remotest villages of Goa. Under the guidance of Green Cross, Mapusa, its volunteers work to rescue, treat and rehabilitate injured wild animals. It also holds live snake handling programmes.

VEAB volunteers document those aspects of Goan folklore which nurture love for Goa's ecological heritage and encourage its conservation within the community. The VEAB has carried out extensive drives to create public awareness and to remove prevailing misconceptions pertaining to the newly declared Madei and Netravali wildlife sanctuaries. Volunteers perform street plays, conduct lectures and stage debates and discussions to build public opinion against the proposed plan of Karnataka government to dam and divert the main tributaries of the Madei river.

The VEAB has an awareness programme for schools and colleges with the support of the World Wide Fund for Nature-India and the India-Canada Environment Facility. It is at present involved in an environmental education programme covering twenty Secondary and Higher Secondary Schools in Goa, under the overall supervision of the Centre for Environment Education, Pune, in association with the Directorate of Education.

The Vivekanand Environment Awareness Brigade do a street play on environment protection



♦ MADEI BACHAO ABHIYAN

Contact: Rajendra Kerkar

The Madei Bachao Abhiyan (MBA) is an all-Goa initiative against the proposed damming and diversion of the tributaries of the river Madei.

In September 1997, Mrs. Nirmala P. Sawant in collaboration with Rajendra Kerkar of the Swami Vivekanand Smruti Sangh, took a panel of Goa's journalists to the sites of the proposed Madei project and briefed them about the fearful consequences of the project for Goa. The Madei Bachao Abhiyan (MBA) was formed under the leadership of Mrs. Nirmala P. Sawant in October 1997 in order to give concrete shape to the mission to save the Mandovi river. The river, besides being a source of livelihood for the agricultural and fishing communities, is also an important navigational channel for the state's mining and tourism industries.

In an attempt to garner support from similarly affected people in Karnataka's border talukas, MBA established contact with the Belgaum Nature Club which has also been agitating for the conservation of a 700 square km area in and around the Western Ghats, from where the Madei river originates. This area, lying in the districts of Belgaum and Uttara Kannada in Karnataka and partly in Goa, is the home of the tiger and the black panther while the Barapeda caves house the Wroughton Free-Tailed Bat, the only place in the whole world where these bats are found.

Deforestation and tampering of the water sources in the region would destroy one of the world's most important ecological hot spots. The MBA has already submitted memoranda to the Centre and to the state governments involved protesting any moves to divert the tributaries and is doing everything in its power to thwart the plans of the Karnataka government.

The MBA published a magazine wholly dedicated to the river Madei and her cultural, ecological, sociological and other associations.

♦ GOA RIVER CONSERVATION NETWORK (GORICON)

Contact: Rajendra Kerkar

The Goa River Conservation Network is an initiative of the riverine people of Goa to conserve and protect the unique ecological and cultural heritage of Goa's river basins, the sustainable economic activities dependent upon them and their life-support systems.

The network was established in July 1997 as a people's non-governmental platform with the following aims and objectives:

1. To empower the people dependent upon the Madei/Mandovi, Tiracol, Colvale/Chopdem, Zuari, Sal, Talpona, Galjibaga, Sateri, Mandrem and Harmal rivers and their tributaries to fight for their traditional ecological, cultural, social and economic rights and for the sustainable use of the biotic and abiotic resources of these rivers;
2. To survey, identify, and document hot spots of aquatic pollution and initiate appropriate and timely action at community and government level to prevent and control them;
3. To undertake community education drives for documenting and transmitting local knowledge about riverine resources and their sustainable use;
4. To prepare people's master plans for the conservation and sustainable utilisation of riverine resources;
5. To survey, identify, catalogue, conserve and protect the rich biodiversity of all the eleven main rivers along with their watersheds;

Presently, the GORICON is headed by Dr. Nandkumar Kamat. Rajendra P. Kerkar works as the state organiser, purely on an honorary basis. As its first activity, GORICON prepared a people's memorandum on the Madei/Mandovi river diversion project and got it signed by all the eleven chairpersons of the village panchayats of Sattari. This was submitted to the Panel of Experts on the Madei's Master Plan and also to the Irrigation Minister of the State.

GORICON built up public opinion regarding the importance of the Goa Groundwater Conservation Bill, 1997. It has decided to prepare a database of knowledgeable people from all riverine areas and to form a library of photographs and documents. It intends to bring out a handbook on the ecological and economic importance of the eleven rivers of the State.

GORICON will support small projects in educational institutions located in the riverine areas in consonance with its aims and objectives. It will also publish a bulletin called 'Gomant Sarita Varta'.

Lamanis: Friends of the Earth



Neil Alvares of Southern Birdwing prepares to release a baby croc into the Cumbarjua

♦ SOUTHERN BIRDWING

Contact: Harvey D'Souza & Neil Alvares
94-B, Bairro Fortawaddo
Nerul, Bardez, Goa - 403114
Tel.: 401814, 402957
email: birdwing@rediffmail.com
website: www.southernbirdwing.com

Southern Birdwing (SB) is an enterprise started in October 1997 by two of Goa's wild life enthusiasts, Harvey D'Souza and Neil Alvares dedicated to the conservation of wild life in Goa.

SB has worked on protecting crocodiles in Goa, as well as on rescuing captive crocodiles and releasing them into the wild, activities in which it has had remarkable success.

The organisation conducts regular crocodile safaris in the Cumbarjua canal. These safaris, which are quite popular with tourists, are a fantastic way of getting people acquainted with these creatures, as well as generating funds for SB.

SB has also developed considerable expertise in the area of bird life. It has conducted fieldwork in the study of birds and also butterflies. It also rehabilitates snakes and captive birds in the wild.

SB organises regular bird watching trips for Goans to local spots to acquaint them with the magnificent bird life available around their villages. Trips have been organised to Miramar beach Saligao springs, Porvorim plateau, Cumbarjua canal etc. These trips are very popular and on an average at least 40-50 persons are present on each occasion, eager to know about birds.

SB is part of the Wild Life Rescue Squad of the Goa Forest Department. Harvey D'Souza has been appointed Honorary Wild Life Warden by the Chief Wild Life Warden of the state. SB was honoured by the Forest Department in 1999 on the occasion of Wild Life Week Celebration function for its contribution towards the conservation and preservation of wildlife in the state of Goa, an award richly deserved.

♦ GOA ENVIRONMENTAL ACTION GROUP (GEAG)

Contact: Mr. Floriano Lobo
Hon. General Secretary
Tel.: 293 423
email: geag1@rediffmail.com

Formed on 1st January, 1998. Registration No.6/ Goa/98

Purpose: To fight against noise pollution in the State of Goa, especially pollution through indiscriminate use of funnel-type loudspeakers (horn speakers) to play music, devotional songs etc.

Very active bringing violations to the notice of the authorities. Responsible for changing the format of the licensing form to include the following 'The use of funnel type loudspeakers is prohibited' when issuing licences to play music.

Plans to bring in strict regulation and control on the use of public address systems in the state of Goa.

♦ ANTI-META STRIPS CITIZENS ACTION COMMITTEE (AMCAC)

Contact: Nelson Fernandes, General Secretary,
Eleve Cottage, Cansaulim, Goa.
Tel. 754 657

The Anti-Meta Strips Citizens' Action Committee was set up as a platform for citizens to voice their concerns and focus their opposition towards the environmentally-unfriendly Meta Strips plant.

The Committee has been at the forefront of the struggle against the Meta Strips plant. It has undertaken a variety of actions, including *dharnas*, demonstrations, public protests, consciousness-raising measures etc.

The *lamanis*, if you are willing to acknowledge the true worth of their daily activities, are the best deal Goa's environment could get. Surprisingly, in a State highly wedded to environmental awareness, Goan society is probably the worst deal the *lamanis* have got in return for the services they render. Can we not evaluate objectively, for once, what these patient (and poor) recyclers of what we consider trash actually contribute in terms of resource conservation?

The *lamanis* have erected their makeshift sheds of old and worn corrugated metal sheets at the edge of every Goan city, whether it is Mapusa or Panjim or Margao or Vasco. Into the storage goes usually an awful lot of things: plastic, old metal sheets, newspapers, anything that is discarded by the Goan in the course of his/her life. What the Goans treat as waste, the *lamanis* consider a resource. At appropriate times, trucks come and collect the enormous collection of carefully selected refuse and carry it all to different industrial units where it enters the manufacturing process all over again.

The *lamanis* are an independent people. They work very hard. They do many kinds of physical labour. Women work as hard, if not harder, than the men. They can be seen making the rounds in every Goan village. Very often, even pregnant *lamani* women can be seen collecting material and carrying it all the way to the collection centres. In the process of their collection, the *lamanis* clean up the environment. For that they do not get any environment awards. Instead, they earn plenty of abuse. For strange as it may seem, the *lamanis* are considered 'thieves', ever ready to carry away whatever has been left carelessly around.

A couple of years ago, a couple of *lamanis* were beaten up in a village for allegedly stealing something. Later, the villagers discovered they had made an error when they found the real thieves. But it was the village which suffered for some time because the *lamanis* did not come any more to the area to collect the waste.

The *lamanis* have no fixed residence. Most of the time, they live in ramshackle tents made from plastic sheets and sticks. Every few months, the local municipal councils will have a drive to destroy the settlement on the grounds that it is an encroachment. During those drives, the *lamanis* have no place to sleep. Their collection drives weaken till they find some place to settle down again.

So it is time we change our perceptions about the *lamanis* and their contributions to environmental conservation. Thieves there may be, not just among rag-pickers, but in banks, offices and government. Our politicians, we are now all fully convinced, are the worst thieves. They loot the public exchequer and siphon off funds into personal coffers.

Politicians have very little social or environmental use. We could do without them altogether. But could we do without the *lamanis*?

◆ GOA DESC RESOURCE CENTRE

Contact Persons:

Lillian D'Costa & Roland Martins
11, Liberty Apts., Feira Alta,
Mapusa Goa 403507

Tel: 252660

email: goadesc@goatelecom.com

The Goa Desc Resource Centre (GDRC) is the activity of GOA DESC, a registered trust, set up in 1998 with the aim of addressing the lacunae in the availability of critical, alternative materials. The Centre is equipped with information on various social issues, painstakingly accumulated at the local, national and international level. The GDRC hopes to act as a catalyst in stimulating the process of pro-people development. Thus the activities of GDRC are centred around providing Documentation, Education and Solidarity with an activist perspective.

The GDRC Library has a collection of magazines and newsletters, books, resource papers and a huge collection of Press clippings in English and Marathi under 26 different topics, including Tourism, Children, Human Rights, Environment, Women and all subjects on Goa. It also has a small collection of video films and poster exhibitions that can be borrowed by the public at a nominal fee. Photographs of numerous campaigns and events can be accessed for reference and for copies. GDRC also provides a 'Documentation by Post' facility wherein issue based press clippings are periodically mailed to subscribers. The GDRC Library is open for reference from Monday to Friday.

GDRC also conducts sessions, seminars, workshops for schools, service clubs and other institutions. A prominent activity of the Centre is the *Friday Balcao*. A fortnightly session with the motto '*Let's make things happen*', Friday Balcao provides a space for people to come together, exchange views, share experiences and discuss workable solutions. GDRC also publish the Social Issues Calendar, which lists all days of social importance which are observed locally, nationally and internationally.

Goa Desc is committed to working with people at the grassroots and helps to organise people into Village Samitis, Consumer Forums, Women's groups and Social Action cells. It also provides guidance and assistance to these groups in addressing the appropriate authority to redress their grievances. Goa Desc is also in solidarity with people, struggling for the protection of the environment, and in this regard has associated itself with the struggles of people in Divar, Cakra and in the coastal villages of Candolim and Calangute.

A recent initiative of Goa Desc is Goa CAN (Goa Civic & Consumer Action Network), a network of the *samitis*, forums, cells and groups it has set up over the past few years. Through ready-to-use complaint formats, citizens' charters, lists of contacts etc. Goa CAN will enable groups to work on issues of civic and consumer concern,



Common krait

including environmental issues.

For its funding, Goa Desc Resource Centre is primarily dependent on donations from well-wishers and sympathisers. We look forward to contributions from citizens, grants from foundations, charitable trusts, fellowships, sponsorships to carry us through.

◆ GOA ENVIRONMENT FEDERATION

Contact: Avertanus D'Souza, President
E-74, Campal, Panjim, Goa - 403001

Tel: 453552; 223404

The citizens of Goa had constituted an Environment Commission to investigate complaints about the degradation of the environment. The public hearings received an overwhelming response. At one of these hearings, in 1998, it was felt that there should be an ongoing monitoring of activities, and prompt action to deter activities which were detrimental to the environment. At that time, the Goa Environment Federation was formed with 3 life members, 135 individual members, 9 organisational members, three eco-clubs and 15 student members.

GEF conducts site visits to affected areas, highlights the environmental issues in the press, follows up matters with the authorities and has also filed PILs on some issues.

Issues taken up by GEF include:

1. Food Festivals on beaches of Goa
2. Noise pollution
3. Exhibition on Alternatives to Plastic Carry-Bags
4. Solid Waste Management
5. Destruction of bunds in Divar
6. Destruction of mangroves near Mandovi.

◆ ANTI-POLLUTION CITIZENS' COMMITTEE

Contact: c/o Francisco Barreto,
Opp. Holy Spirit Institute, Largo Padre Jose
Vaz, Margao 403 601. Tel: 732840

Much of the struggle against the polluting activities of the Zuari Agro Chemicals has been continued by the Anti-Pollution Citizens Committee. The two principal people behind the committee are Francisco Barreto and Roque Santana Fernandes, former MLA. Barreto has maintained a careful record of all his correspondence with the Ministry of Environment and Forests, the Goa Government, Zuari Agro Chemicals and the Goa State Pollution Control Board.

The committee continues to monitor Zuari Agro Chemicals and to file complaints with the relevant authorities whenever it dumps untreated effluents into the sea or discharges air pollutants in excess of the standards.

School children examine baby turtles



Hareey D'Souza

♦ NIRMAL VISHWA

Contact: K.D. Sadhale

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Nirmal Vishwa, the oldest of the existing local environmental NGOs of Goa was formed for dissemination of environmental awareness in Goa. It was not intended to be a fully professional environmental body and it does not have a full-time worker. The organisation did not attempt to run any funded programmes but attended to local issues, spending money from the pockets of its members.

Extensive public awareness programmes in educational institutions were organised initially and lobbying was also done at government level. Some of the action programmes taken up were creative while others were in the nature of protests. At the outset, a nursery was developed at Ponda to bring the green culture to the town. We were the first to start regular plant festivals in Goa. These are held twice a year—a monsoon and a winter festival.

Tree plantation in public places was taken up with the intention of facilitating exposure of students to ecology. A barren hillside in the town, of about five hectares, was thus completely greened. The organisation played a key role in the successful agitation against the multinational mega project, Nylon 6,6. A campaign for ecological and cultural conservation of the temple belt against the invading tide of urbanisation has also been taken up. A video film 'Shadows on the Towers' has been made on the subject.

Nirmal Vishwa mobilised public opinion against bulldozing of hills at Ponda for making plots by powerful political persons and estate developers. A writ was filed at the High Court and bulldozing was stayed. This resulted in a halt to bulldozing in other parts of Goa as well.

In another case, Nirmal Vishwa joined Goa Foundation in a successful writ petition to stop urban development at the cost of hill-slope forest near Panjim. Nirmal Vishwa also joined in another writ by several environmental organisations to foil the attempt of the Government to open steep hill slopes for development.

Nirmal Vishwa made a study of perennial waterbodies of Ponda, prepared a video film, 'Springs of Ponda', and developed an abandoned spring into 'Hanuman Teerth'. This was very much appreciated and other municipalities in Goa also took up such programmes.

When malaria broke out in Ponda, Nirmal Vishwa carried out massive field action programmes to destroy the mosquito breeding grounds.

Nirmal Vishwa carried on strong awareness programme on waste management with 'zero garbage' concept. Nirmal Vishwa also participated in 80 days Plastic Free Goa campaign.

It published quarterly bulletins on environmental issues for some years through Government as-

sistance. But it had to stop on account of lack of manpower.

History of ecological movements has amply proved that effective environmental conservation can be achieved only by working at the micro level and that legislation alone will not yield the desired results. This is our firm belief. Change of self and life-style for self-reliant and sustainable living, will inevitably produce lasting salutary results in environmental conservation. Working with oneself for self-transformation is the starting point of a sustainable and humane civilisation.

♦ PEACEFUL SOCIETY

Contact: Kumar Kalanand Mani

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Tel.: 392236/7

Fax: 392 382

email: peaceful@goatelecom.com

Established in 1984, Peaceful Society is committed to the creation of a stable environment. It aims to ensure a sustainable and ecologically balanced future development for the rural poor.

This is achieved by:

- Promotion of ecological farming including compost, bio-gas, re-afforestation and animal husbandry.

- Encouraging local self reliance with diverse cropping.

- Assisting in the formation of a coalition of local groups striving for sustainable development and the protection of local natural resources.

- Formation of Wildlife Protection Group (WPG) to foster a culture of environmental protection amongst urban youth.

Peaceful Society has:

- coordinated the 'Save the Western Ghats March' and assisted in the formation of the 'Save the Western Ghats Movement'.

- organised a movement of forest dwellers against their eviction.

- conducted workshops on Biodiversity of Goa, Medicinal Plants of Goa, Water Harvesting, Natural Farming etc.

- organised National Environment Awareness Campaign (NEAC) for four years.

- been involved in the formation of the Indian River Valley Network (IRN) and 7 River Basins Consortium.

- mobilised the Gram Sabha against the expansion of an Industrial Estate.

♦ SALIGAO CIVIC AND CONSUMER CELL

Contact: Mario Mascarenhas

C/o House No. 509, Saligao - 403 511

Tel: 278276

email: elinks@goatelecom.com

Saligao Civic and Consumer Cell (SCCC) is a village action group that attempts to be vigilant about and participate in village life. Through handbills, posters and the media, awareness is spread about various local issues. By this process of awareness, vigilance and participation, SCCC helps citizens realise that the power to decide the future of their vaddo and village, lies in their hands.

Campaigning at grassroot levels, the SCCC has successfully shown that the villagers could stop the government from converting their Salmona Spring into a tourist attraction. Armed with placards, angry villagers chased away the Director of Tourism when he came to take over the Spring.

Again, people's united action protected their environment by preventing a polluting plastic factory from entering their vaddo. Urging villagers to safeguard their environment, SCCC has also campaigned against garbage dumping in the village by coastal hotels and a local poultry farm, well pollution, sale of village well water to luxury hotel swimming pools, etc.

Motivated to 'think globally and act locally' and vice versa, SCCC has networked with groups in the State, country and abroad to campaign against the sale of village water to hotels for European charter tourists to swim in.

Besides environmental concerns, SCCC also encourages local participation in village and State level issues concerning women, civil liberties and democratic rights, police atrocities and human rights. Development problems of land, electricity, water, roads and transport are highlighted and solutions are sought through people's action.

Along with SCCC, villagers participate in local self government by attending panchayat meetings and Gram Sabhas in order to make their voice heard and power felt. During the elections, SCCC conducts its own campaign by distributing a 'Villagers' Manifesto' to increase grassroot political consciousness.

SCCC is a secular, non-funded, voluntary group, unaffiliated to any political party.

♦ MARGAO ARCHITECTS ACTION GROUP

Contact: Sarto Almeida,
Indian Architects Association,
Pelican Building, Margao 403 601.
Tel: 732452

The Margao Architects Action Group (MAAG) was formed in 1987. It comprised a group of Margao-based architects who had done a great deal of public interest work on the development of the town and felt it was now time to have a name.

In August 1987, MAAG submitted a set of proposals for Building and Planning Byelaws to the Chief Town Planner for consideration of the government. The following year it prepared landscape designs for 23 public open spaces including the afforestation. It also marked out conservation zones for the consideration of the authorities.

At the request of the Margao Municipality, MAAG designed and supervised the construction of a Children's Play Park at Gogol which has proved very popular and has been much appreciated. MAAG undertook this work gratis, as its contribution to the town.

MAAG's efforts to see that Margao develops on sane lines have been a long and continuous struggle against vested interests and the authorities, and though it has engendered public awareness there have been few substantive gains. MAAG's conservation proposals which were under fire from the builder's lobby came up for discussion at the Town and Country Planning Board Meeting of June 20, 1991 without coming to any conclusion.

In August 1991, the Chief Secretary had a sites-cum-luncheon meeting with MAAG. The inappropriateness of the proposed site of the railway overbridge was seen as also the site and the good points of MAAG's alternative proposal. The other points discussed and the sites visited were locations for new market complexes, parking for the central commercial area and its pedestrianisation, the vehicular traffic flow and the urgent necessity of the ring road, and the restoration of the first Municipal building of Salcete at the Old Market for which a Trust was willing to disburse funds. This building restoration was to be linked to the redevelopment of the Old Market and its consequent upgrading.

MAAG is still not a registered society. It is an informal group having no office bearers. All the architects of Margao are automatically members and for important meetings all of the architects generally attend or send in their views. MAAG started with 12 members. It now has 21 members.

Recently with the help of the present Minister for Urban Development, Mr. Digambar Kamat of Margao, MAAG has intervened successfully in certain development proposals for Margao. These include the modification of the landscaping layout of Lohia Maidan, the redevelopment of Tarcanzor, a mineral spring of therapeutic value at Aquem, the redevelopment of Ana Fonte as a recreational park, the layout plan of the Ravindra Bhavan, and the layout of certain road junctions which were traffic problem spot.

♦ THE INDIAN HERITAGE SOCIETY

(Goa Chapter)

Contact: Percival Noronha,
E-426, Fontainhas, Panjim - 403 001.
Tel: 225726

The Indian Heritage Society (Goa Chapter) was established in 1982 to draw the attention of the public and the Government to the dangers which threaten the irreplaceable resources of the country, specifically of art and architecture, and to devise measures for their protection and preservation.

From the very beginning, the Goa Chapter has endeavoured to kindle among young people an awareness for the pressing need to conserve and improve the eco-environmental system endowed by nature, as well as to improve and preserve the human-made environment such as houses having Goan architecture, clean surroundings, beautiful orchards, wide and clean roads, aesthetically constructed parks and gardens, etc.

The Heritage Society has representation in various government committees like the Award Committee for best craftsman, the Archives & Archaeological Committee, the Conservation Committee etc. In fact, the Conservation Committee was constituted at the instance of the Goa Chapter. It was due to the efforts of the Society that the Tree Act was also enacted.

The Society has been disseminating the cultural values of Goa through talks, exhibitions, slide sessions, souvenirs, pamphlets, write-ups etc. and has also launched a scheme for a source book on Goan villages.

Recently, a project to preserve monuments and sites of historic importance, not covered either by the Archaeological Survey of India or the State Department of Archaeology, with the involvement of students of various colleges of Goa, has been conceived. One such monument was the 'Arch of Conception' in Old Goa which was covered with a thick growth. Other structures needing such attention are being listed.

♦ GOA HERITAGE ACTION GROUP

Contact: Ms. Heta Pandit, Hon. Secretary,
29/30 Green Valley, Kamat Complex Phase I,
Porvorim 417 507. Tel: 417057
email: hetapandit@rediffmail.com

This is a recently formed group with the objective of protecting the natural and built-up environment of Goa. A number of architects and conservationists are members of this group.

Among the early activities of the group has been a Goa Heritage Festival which was organised in Panjim in 2001. Recently, their efforts have been directed towards protecting certain heritage buildings, including the historic Provedoria building, which the Government has announced plans to demolish in pursuit of 'modernisation'.

♦ FUNDAÇÃO ORIENTE (Orient Foundation)

Contact: 175, Neri Felipe Xavier Rd.
Fontainhas, Panjim, Goa.
Tel.: 230728, 436108

The Fundação Oriente was founded on March 18, 1988 and has its headquarters in Lisbon, Portugal. It is a private institution with corporate identity and has delegations in the People's Republic of China (Macau) and in India (Goa).

The Fundação aims to carry out and support activities of a cultural, educational, artistic, philanthropic and social nature. Within these general aims, the Fundação seeks to maintain and strengthen the historical and cultural ties between Portugal and countries in Asia.

The Delegation of Fundação Oriente (DFO) in India was established in April 1995 and it operates under the guidelines laid down by the Indian Council for Cultural Relations, Ministry of External Affairs, Government of India.

The DFO in India has been actively engaged in promoting the Fundação's objectives, namely to maintain and strengthen the historical and cultural ties between Portugal and India. Our main activities include the restoration and conservation of historic buildings and monuments, awarding scholarship for study or research in Portugal, sponsorship of conferences and seminars, promotion of local art and culture and cultural exchange between Portugal and India in the way of sponsorship of performing artistes, writers, painters, etc.

A number of conservation and restoration projects were undertaken by Fundação right since the settling up of the Delegation in India which started with the building in which the Delegation itself is housed. A major project which was coordinated and financed by the Fundação till 2001 was the restoration of the Capela de Nossa Senhora do Monte (Chapel of Our Lady of the Mount) in Old Goa.

♦ MIRAMAR BAYWATCH ASSOCIATION

Contact: Anand Madgavkar (President)
Nizari Bhavan, 5th Floor, Menezes Braganza
Road, P.O. Box No.143, Panjim, Goa.
Tel: 431192, 431215 Fax: 223126
Email: masalv@goatelecom.com

The Baywatch Association was set up and registered in 1999 with the sole intention of saving lives from drowning at Miramar beach and to ensure that the beaches are maintained in pristine condition by coordinating efforts of the public and those of government departments. In three years, it has saved 20 people from drowning.

The Association is also committed to setting up similar associations on other Goan beaches.

♦ NISARGA NATURE CLUB

Contact: Nisarga Centre, Aparna Mansion
Ansabhatt, Mapusa 403 507, Goa
Tel: 262362 (Mapusa) 753832 (Margao)
email: nisarganatureclub@rediffmail.com

Nisarga Nature Club was founded on 7th December 1992.

Mission:

1. Plant a million trees under the Programme 'Million Trees in the new Millennium', and make partnerships with other organisations for the purpose.

2. Set up a Botanical Garden of international standards in Goa.

Projects:

1. Amaranth, a nursery project along with N.S.S. unit of Saraswat College, Mapusa raises about 1000 tall trees every year in 14" length HDPE polybags, of more than 25 to 30 varieties of forest species, to conserve biodiversity.

It supplies 10,000 saplings to Forest Department every year.

2. St. Xavier's Arboretum: Since 1994, Nisarga undertakes ongoing tree planting on a scientific

Nisarga volunteers help clean up Carambolim Lake



scale in the campus of St. Xavier's College, Mapusa. Every new variety of sapling propagated in the nursery, or available in any nursery, is planted in this Arboretum. Present strength about 200 plus trees.

3. St. Xavier's College: Water harvesting project.

Other Projects:

1. Rotary Club Children's Park, Dattawadi: a project of Rotary Club of Mapusa, 45 trees of different types planted by Nisarga.

2. Chandranath Apartments, Mapusa.

3. Eliza Estate, Karaswada, Mapusa. About 50 trees planted in both the colonies put together.

4. Ganeshpuri Housing Board Colony, Mapusa.

5. Guirim-Karaswada bypass: About 100 trees planted along the road by Mapusa Junior Chamber.

6. Curca Watershed Development Programme: Over the last three years 1999, 2000 and 2001 trees planted along the drainage line and watershed area in sunken ponds in Curca. About 300 in number.

7. Goa University Botanical Garden: Over 60 trees have been given to Department of Botany, Goa University, Taleigao.

8. Tivim and Malpe Railway Stations: Under a Jaycee Project several trees, including a Peepul, was planted in Tivim Railway Station. During 2000 and 2001, about 40 trees of different species have been established in utterly poor soil on the embankments of the railway station.

9. Salmona Spring, Saligao: This small pocket of greenery is being conserved. Nisarga has submitted its survey numbers and plan of the area to the Forest Department for inclusion of the area under protected forests.

It has managed to demolish one illegal construction that was coming up in the area, and is

pursuing another matter with the Director of Panchayats.

10. Expert Committee on Forests:

Beginning from 1997, Nisarga has conducted survey of private forests in almost all villages of Bardez and Tiswadi. In 2000, villages of Assagao and Siolim, and Mapusa were intensively surveyed by members of Nisarga, and report of private forests with form I & XIV were submitted to the Conservator of Forests.

♦ BAILANCHO SAAD

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Panjim - 400 001
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email: alal@goatelecom.com

Bailancho Saad (BS) is a Goa-based women's collective striving for a just and humane society.

The perspective with which it approaches the environment question has evolved over the years and it can be briefly summed up as under:

Nature and humankind are linked in an interdependent relationship in which what happens to the one affects the other, and violence against the one causes violence or harm to the other. Both are marginalised by the existing development policy. Women are the hardest hit. Hence, as women are an integral part of the earth they must be very much a part of the decision making processes that define and shape society.

At the same time, the experience of women who have not yet got trapped into the commercialisation of nature is important. It is an experience of evolution of sustainable methods of development. Therefore it is only natural that women should have the space to articulate their own needs and the needs of the communities they are based in and to affirm their own values—values that give central importance to survival and to caring for all that is alive.

In this context BS has, since its formation in 1986, been raising questions and challenging a development pattern that does not take women, other marginalised sections and the environment into account.

Projects like the Nylon 6,6 plant, modern tourism projects, nuclear plants present and proposed in Goa's vicinity, the Konkan railway, golf courses—are all projected as 'development' oriented. BS has studied these, taken stands and actions challenging them accordingly. BS is currently engaged in a struggle to prevent the proliferation of casinos in Goa.

BS tries to present its perspective in the following ways: Demonstrations to oppose certain projects, exhibitions, public meetings where speakers knowledgeable in the subject have addressed the people, meetings and talks in schools, colleges, villages and for groups, publication of booklets and articles, writing in the newspaper. The implications of these projects specifically for women are brought out, without missing out on the overall picture. Also special effort has been made to take the views of women on these projects and/or to give them information reliably gathered on the same. BS functions as a collective.

♦ THE GOA FOUNDATION

Contact: Claude Alvares, Director
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Feira Alta, Mapusa - 403 507
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email: oib@goatelecom.com
Webpage: www.goacom.com/goafoundation/

The Goa Foundation was registered in 1986 by a few individuals from different parts of Goa committed to protecting the Goan environment and the Goan quality of life. A number of activists and academics felt it was time Goa had an independent, research based institute that would concentrate on studies relating to the Goan ecosystem, and that would also act as a watchdog on government and private interests on environmental issues. Two of the original trustees, Norman Dantas and Walfrido Antao, who were also pioneering environmental activists, have since died.

From the Foundation's inception, the trustees opted for research that would lead to action in the public interest. They felt that armchair or purely academic research was very often of little relevance for the ordinary Goan's problems of survival.

The trustees also felt that the Foundation should monitor the economy and keep the Goans aware of what was happening in different sectors, and educate them, not just about the concentration of economic power and wealth, but also about the connections between economic interests and political interests.

One of the Foundation's first public actions was to file a public interest litigation (PIL) against the extraction of sand from the South Goa beaches for industrial use. Later, it filed a petition against the wrongful constitution of the new State Pollution Control Board, and succeeded in compelling the government to modify the Board.

When the chlorine gas disaster occurred at Cortalim, it was the Foundation's staff who

visited the site, took pictures and surveyed the damage to the victims. It later helped the victims file a writ petition in the High Court for damages. A couple of years later, another accident involving chlorine gas leakage occurred at Chinchinim. This time the Foundation helped the victims obtain monetary relief under the newly instituted Public Liability Insurance Act.

In recent times, the Foundation has filed writ petitions against the construction or expansion of a number of hotels on Goa's beaches on grounds of violations of environment laws. Some of these petitions involve the Cidade de Goa, Dalmia Resorts International, Leela Beach, Majorda Beach Resort, Taj Holiday Village and Hospitality Resorts. The entire list of PILs is listed separately in this chapter. They are more than seventy. All these petitions have been argued by lawyers without cost to the organisation.

The Foundation also maintains a presence in the Supreme Court, where it has intervened in several matters including the petitions dealing with the CRZ Notification and aquaculture. Recently, the Foundation filed a petition directly in the apex court challenging the setting up of a new committee to examine the status of private forests in the state. The Foundation argued that the new committee was set up with the mala fide intent of removing several survey numbers identified as forest by an earlier committee of the Supreme Court.

Besides its research and legal work, the Foundation also organises public education workshops. It held a workshop on Environment Law and Environment in Goa for lawyers and activists. It has conducted two extremely popular courses on Public Interest Litigation in Panjim and Margao, during which it trained over 200 citizens in the art of filing court petitions to get reliefs. This work is continuing, with further workshops planned in Ponda and Bicholim.

The Goa Government is now supporting a two year project of the Foundation for successful

implementation of regulations relating to garbage in the State. As part of this commitment, the Foundation has been assisting the government with technical advice on the erection of earthworm bins for various categories of users, use of effective microorganisms, and strategies to make the state 'plastic-free'. The project will be completed by March 31, 2003. In the meanwhile, as part of the project's commitment to creating widespread public awareness of garbage related issues, the Foundation has brought out two issues of the *Goa Garbage Times*, a unique newspaper not seen anywhere else in the country.

The Foundation has also been nominated as the nodal agency for the preparation of the Goa Biodiversity Strategy and Action Plan (SAP) by the Ministry of Environment and Forests. Work on the Plan commenced in 2000. The draft report was submitted to the government in April 2002. The final SAP will be submitted to the government in July 2002.

For two years, the Foundation brought out a special newspaper designed only for tourists called the *Green Goa Tourist Guide*. The Foundation is now in the process of preparing a Green Map for tourists who may wish to visit other interesting natural and man-made sites besides the beaches.

It is not well known that the Foundation initiated the Olive Ridley turtle nesting conservation programme on Morgim beach. The programme has become a great success, with turtle nesting now underway at other beaches including Agonda and Galgibaga. The programme is now fully supervised by the Forest Department, with the assistance of local communities.

The Foundation does not accept foreign funds. It accepts grants from UN and governmental sources. Its present day resources come from grants from the Ministry of Environment (Central Government), grants from the Government of Goa, consultancies, sales of *Fish Curry and Rice*, contributions from its trustees from time to time and donations from the Goan public.

Publications:

- *Sand Mining, Beach Resorts and the Destruction of the Sand Dune System in Goa.* (1989)
- *Report of the Task Force on Safety in Hazardous Industries in Goa.* (1989)
- *Sand Extraction: Case History and Final Judgement.*
- *The Right to Know* (Judgements).
- *The Ecological Impact of the Konkan Railway in Goa.*
- *The Raunaq Singh Report on the Free Port of Goa.*
- *Fish Curry and Rice* (4th edition)
- *The Goa Law Reference*
- *The CRZ Notification*

Forthcoming:

- The Environment Activist's Manual*
- Goa's Biodiversity: Strategy and Action Plan*

Birdwatching session with Southern Birdwing on Miramar beach



Harvey D'Souza

◆ BOTANICAL SOCIETY OF GOA

Contact : Antonzito Gomes, Secretary
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The Botanical Society of Goa (BSG) was registered on 4 May 1990, by a group of botany teachers and plant lovers from all over Goa. For a decade (1980 to 1990) there was a Botanical Society at Dhempe College of Arts & Science, Panjim, and this was amalgamated into the all-Goa body. From 1996 life membership of BSG was thrown open to any plant lover irrespective of educational qualifications or profession.

The BSG deals with the entire spectrum of plant science, and even other branches that have an impact on plants. Vermiculture, insect management and even the ferocious protectors of mangroves, the crocodiles, are of interest to BSG. It organises workshops, seminars, exhibitions, lecture-demonstrations, hands-on training, nature trails and hikes for its members and the general public. In the last five years, the students of schools and colleges has been a special focus of BSG activity.

Normally, BSG does not take an activist role. It is not an advocacy group. We have strong advocacy groups to play that role in Goa. Many BSG members are part of advocacy groups and other BSG members benefit from their experience.

The BSG does undertake projects to promote awareness of current issues in environment. It helps demystify science and strip it of jargon to make it easily understandable to the general public. It has its own newsletter, BUDSPORT, and a mail list <goanet_bsg@goacom.com> to communicate with its members on a regular basis. It freely interacts with both Government Departments and other NGOs. In fact it has the Forest Department, Directorate of Education and Fundacao Oriente as its institutional members.



Colvale Jagrut Manch protesting illegal dumping of Mapusa garbage in Colvale

◆ COLVALE JAGRUT MANCH

Contact : Mathew Pereira
Matstel Villa, H.No.417,
Colvale, Bardez, Goa

Mathew Pereira has set up an NGO in Colvale comprising local villagers who are determined to deal with some of the environmental problems the village faces.

The group was hyper-active when they stood down Chief Minister Manohar Parrikar's efforts to dump Mapusa garbage on the Colvale plateau. The MMC had to shift dumping its garbage to Curca outside Panjim, with the Panjim Municipal Council clearly unhappy with the situation. Now Pereira has filed for an order under section 133 of the CrPC to have the MMC remove the garbage it dumped in Colvale before it was stopped.

A month ago, the Manch discovered to their horror at least 18 sites in the village where industries from Verna were dumping their hazardous industrial wastes. The Manch did a thorough investigation, found out the names of the compa-

nies involved, videotaped the wastes, took pictures, went and met the Chief Minister and also filed an application under section 133 CrPC. They also went to press. They took samples of the wastes and the ashes and took them to the University for testing.

On April 29th, 2002, the Mamlatdar of Bardez issued a conditional order directing the companies to stop further dumping and to have the materials already dumped removed within 15 days.

Environmental Education

There are three institutions involved with environmental education in the state.

1. Therese Almeida has probably done more work than any other person in the state on environmental education. She therefore falls under the category of an 'institution'. She has written a resource book for environmental education for Goan schools which is available from DSTE or Other India Bookstore. She is the Principal of the Manovikas school in Margao.

2. Nirmala Institute of Education has a syllabus on environmental education for its teacher training programmes. The Institute is located at Altinho, Panjim.

3. Centre for Environment Education, Pune, organised a number of workshops and came out with a guide/handbook for teachers to enable them to take up environmental education effectively. Now CEE maintains a permanent presence in Goa and can be contacted at the following address:

Centre for Environment Education,
c/o State Institute of Education,
Porvorim, Bardez, Goa.



Goa Biodiversity Strategy and Action Plan

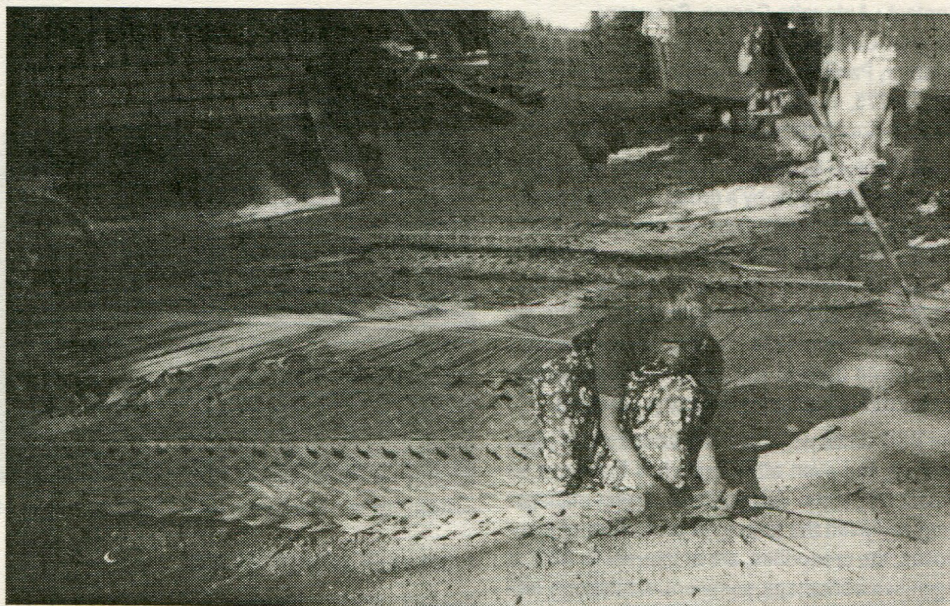
The concern with biodiversity has crystallized world-wide with the adoption of what is known as the Biodiversity Convention. The Ministry of Environment initiated a national project for the conservation and sustainable use of biodiversity and asked NGOs to participate in the process. Accordingly, in Goa the Goa Foundation and the Forest Department were nominated as nodal agencies for preparation of the Biodiversity Strategy and Action Plan (SAP) for the state of Goa.

Goa presents an astonishing diversity of endemic species, habitats and ecosystems. But with 40 years of development now behind it, the impact on biodiversity is visibly noticeable and worrying.

The Goa Foundation first set up a State Steering Committee (SSC). All official agencies and NGOs working with biodiversity issues in any manner were invited to join the SCC. The SCC approached the public through the media and sought assistance in discussing sustainable uses of biodiversity. Thereafter, members of the SCC, who volunteered, were assigned tasks of documenting specific aspects of biodiversity in different parts of the state over a six month period, under the overall supervision of Dr Kamat. The SCC organised several meetings in which the progress of the work was discussed, deficiencies highlighted etc.

The SCC eventually had before it nine reports dealing with how people used biodiversity in various parts of the state. Special attention was paid in the reports to remote areas like Sanguem, Sattari, Quepem and Canacona. These reports came embellished with photographs, lists of species etc. All the reports are being copied on CD and also posted on the Net for more widespread dissemination throughout the state.

Home-based rope-making from coir of coconuts.



A woman weaves a coconut leaf (mollam), which can be used as pakadis and temporary roofing material

The highlights of these reports are given below:

- Fifteen villages in Goa are named after the mango tree, two after the kokum. There are villages named after the Banyan, the Tamarind and the Tulsi.

- Ten villages are named after the tiger, three after peacocks, five after snakes. Villages are named after anthills, forest land, gardens, waterfalls and water bodies.

- The replacement of forest and natural vegetation by large plantations, especially cashew, has eliminated wildlife habitats in several areas.

- The population of monitor lizards has declined because there is no control exercised over the use of their skins for making drums (*ghumat*).

- After several decades Olive Ridley Turtles have

returned to nest on several Goan beaches, pursuant to a successful conservation programme which was initiated by NGOs, local village communities and the Forest Department.

- Wildlife worship in Goa includes the worship of crocodiles (*mangge thapnee*) and termite mounds. Celebrations of Ganesh Mahotsav in Goa has a unique feature of '*Matoli*' a display of seasonal fruits and vegetables hung over the idol.

- Among butterflies, the biggest (Common Birdwing) and the smallest (Grass Jewel) are to be found in Goa.

- 52% of the forest area of Goa falls under Wildlife Sanctuary notifications. 84% of existing forests in Goa belong to the Government.

- Iron ore contaminated sediments from mining areas have formed a film in the estuarine areas and destroyed the clam beds.

- Certain wild mushroom species are in danger of extinction due to indiscriminate commercial exploitation.

- Frogs are illegally served in some Goan restaurants under the nomenclature of 'jumping chicken'.

- *Ganv Bhovni*, village based hunting of wild life for ritual purposes, continues in a few areas despite being in violation of the Wildlife Protection Act, 1972.

- Neither the Regional Plan of Goa 2001 nor the draft Regional Plan for Goa 2010, which purport to control land use in the State, make any reference to biodiversity.

- There are a large number of agro systems designed by local people to suit different ecological niches/needs, each with its own local name.

- Large development projects like the Selaulim and Anjunem dams were constructed without an EIA and without considering impacts on the biodiversity of the areas in which they are located.

The Poder (Breadman)

With increasing urbanisation in Goa, the cock's crow at dawn is no longer the reliable aid of the early bird that it once used to be. But Goans need not lose any sleep over this because the other traditional alarm is still thriving. People all over Goa wake up between 5.30 am and 6.30 am to the honking of a bicycle horn that is literally the harbinger of their daily bread. (Older people will recall that before bicycles appeared on the scene, the plaintive horn was preceded by a bell.)

Goans love bread and their ardent devotion ensures that the '*poder*' (baker) continues to be an enduring institution. Every village has its own little bakery and the produce is delivered fresh to the doorsteps of the consumer at dawn. The baker's boy moves around on a bicycle to the back of which is strapped a large cane basket, filled to the brim with freshly baked '*pao*'. He appraises villagers of his arrival by honking loudly on a bicycle horn. Perhaps not the most musical accompaniment to your departure from the arms of Morpheus, but difficult to sleep through except by dint of long practice.

Those who prefer to awaken late have learnt to sleep through the racket and usually leave a bag hanging near their door into which the boy deposits their daily quota of *pao*. Visitors to Goa who have been indulging in late-night revels can only whimper in pain, cover up their ears and wait for peace to return.

Bread in Goa is regarded by connoisseurs as some of the best available in India. The sheer variety is amazing, though the traditional *pao* is the most popular. This comes in two sizes, (of which more later). Then there is the *poi*, whole wheat bread, flat and round, often with hollows inside. This came till fairly recently in a sweetened version (baked with toddy). Now it is difficult to get such bread any more. Then there is the bow-shaped *pao*. Bangle bread, shaped as its name indicates, and hard and crispy, is still popular. All these are available at Rs 2 a piece. Moving with the times, most bakeries have also begun to manufacture sliced bread, though the taste is not a patch on the more traditional varieties. Besides these, biscuits in a bewildering range of shapes, sizes and tastes are available at most bakeries.

Bakeries begin their baking in the late evening and continue till the early hours of the morning, ensuring that you get your bread oven-fresh as you get up; in fact, it is often still warm when delivered. Many bakers complain that they have discontinued some of the older varieties because of lack of demand.

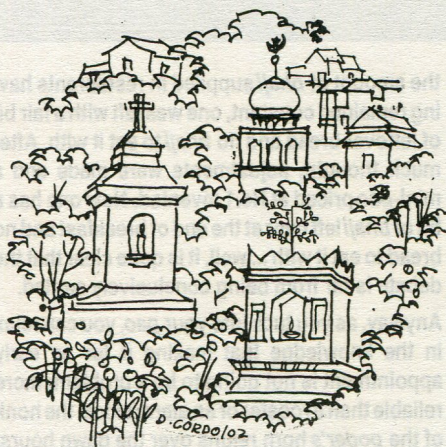
Bread is consumed by Goans in all walks of life. The most popular snack at all local restaurants is the humble *bhaji pao*, priced at around Rs 5-7. It consists of a small *pao* with a spiced broth containing cooked potatoes and pulses. Popular snacks like the *dosa* and the *idli* have made some headway but the *bhaji pao* remains the undisputed monarch of the Goan breakfast.

The central place of the *pao* in the Goan heart, mind (and stomach) was evident in the furor in 1997 when bread prices were almost doubled due to an increase in the price of subsidised flour supplied by the Government. To compensate, the size of the *pao* was increased by a factor of half, in some obscure gimmick meant to confuse and thus mollify customers. The pages of local newspapers were given over to a furious debate over the rights and (mostly) wrongs of the matter, shoving aside issues of mere national and international importance. Complex equations regarding the optimum size and price to give the consumer a fair deal were proposed. It was indignantly pointed out that with the size increase and

the amount of *bhaji* supplied in restaurants having remained constant, one was left with a fair bit of leftover bread and no *bhaji* to eat it with. After much thought, adjustments were made and a mini-*pao* priced at Re.1 invented. Now one has a bit of *bhaji* left over at the end of breakfast and no bread to eat it with ... well, it is quite clear that the debate is far from being conclusively settled.

Anyway, as you tuck into your *pao*, you can relax in the knowledge that making it for an early appointment is not going to be a problem; more reliable than a rooster or an alarm clock, the honk of the *poder*'s horn reigns over the dawn hours. Giving us this day our daily *pao*.





In this final section, we elaborate on the traditions of Goan society, particularly those facets of its culture that have enabled it to protect its ecological endowments.

K.D. Sadhale recounts the intimate links that exist between Hindu rituals and nature.

Norma Alvares examines the close links that have existed between Hindus and Catholics in Goa. These links continue to manifest themselves in a variety of practices.

Ecology is about relationships.

There is no point in establishing relationships with every other species on the planet unless one also has a



Idols with the snake god, worshipped by migrant village community in Sattari

Eco-Traditions

harmonious relationship with other human communities in the same eco-region.

On the contrary, it is only when community relations in multi-religious societies like Goa's are intact, that ecological restoration is also simultaneously possible. If people are cutting off each other's heads, it is pointless talking to them about the felling of trees.

In the past couple of years some hostilities have been stimulated between the two major communities in Goa. Hatred is being nurtured, not yet openly, but through devious and disguised means. This chapter is designed to sound the alarm, so that men and women of goodwill will not succumb to the easy charms of hatred and violence, and talk of peace instead.

NATURE IN HINDU RELIGIOUS RITUALS

Hinduism is not a monolithic religious faith and it is difficult even to call it a religion. It embraces various ideologies of the Divine, some even quite contradictory to each other, such as the *Dwaita* and *Adwaita*. All these ideologies are, however, meticulously interwoven in the strong social fabric which is designed to take care of the social and material needs of society. The ecological and ethical norms of human survival and social health are so intricately and imperceptibly fused with cultural practices and beliefs that it is impossible to separate them.

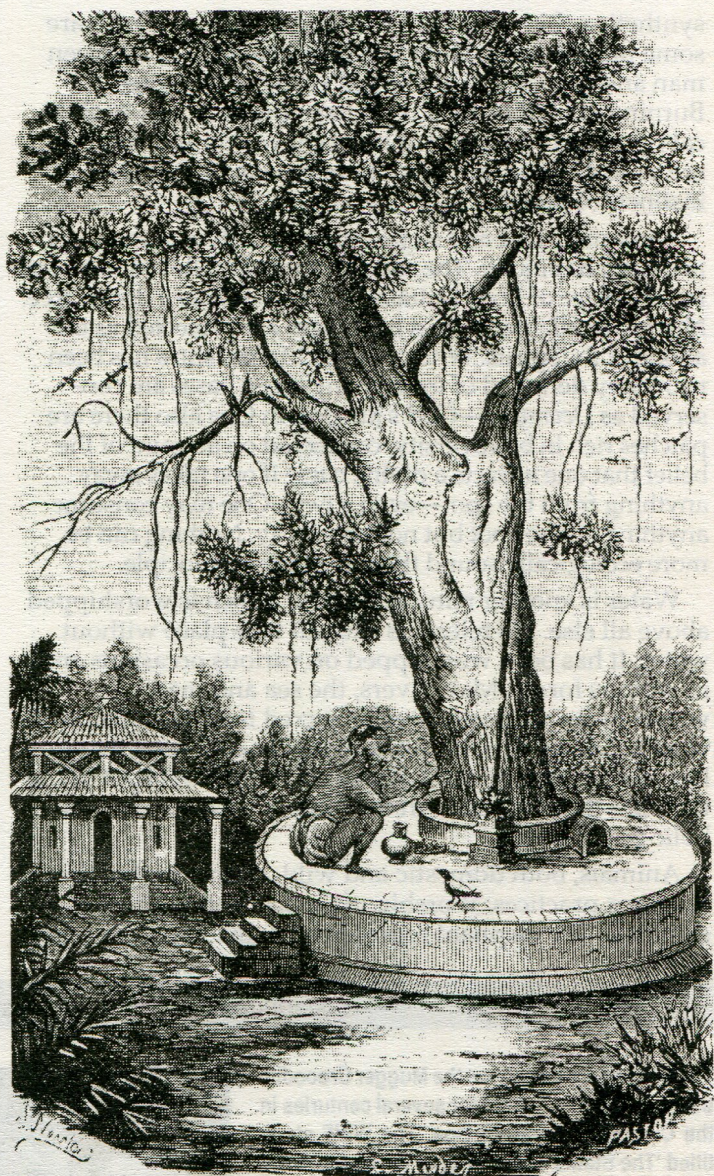
The Hindu day starts with the ritual of *Namaskar* to mother earth before one puts one's step on the ground from the bed. The one line prayer describes the earth as *Laxmi*—the goddess of wealth—with the hills as her breasts and the sea as her sari.

The Hindu year starts with the month of *Chaitra* (around March-April) with the hoisting of a new year flag along with mango leaves and flowers. Whatever may be the menu of the day, one indispensable component is a pinch of *chutney* of *neem* leaves with pepper, jaggery and salt for taste. Worship of *Chaitragauri* and *haldi kumkum*, by female members of the household includes the serving of wild seasonal (spring) fruit, fruit juice and soaked *chana dal* with raw mango salad. All rituals include eatables that are the speciality of the particular season.

Although the Hindu calendar is a lunar one it has been wonderfully adjusted with the solar movement so that the lunar month also follows the solar track. (In the Muslim calendar, which is lunar, a lunar festival which sometimes comes in December, after some years may come in June.)

Hindus are very conscious of the need to identify 'time' which is always related to astronomical movements. The priest, during any ritual such as *pujas*, quotes the celestial positions of not only the sun and the moon but all the main planets.

Special celebrations worship the sun and planets. The movement of the sun from the southern to the northern hemisphere and vice versa is celebrated as *Sankrant* twice a year. Spring is celebrated as *Vasantotsava*. Rituals for welcoming the monsoons differ from region to region. After the monsoons, the joy of clear skies with full moon is celebrated at night, serving white eatables (the colour



of the moon), flavoured milk being the main item. On *Makar Sankrant* which is in winter, jaggery and sesame seeds—of high caloric value—form the main ingredients of the sweet dish.

The relation of man to trees has been well acknowledged and the diversity of vegetation is conserved through rituals. As mentioned earlier, *neem* is used on one occasion. Similarly various other trees have their appropriate days and places in rituals. *Vatapoornima* is intended for worship of the banyan tree by married women on the full moon day in the month of *Jyestha*. There are about a dozen *vratas* and *pujas* for which leaves of dozens of varieties of specified trees, plants and grasses are offered. These include the ordinary *hariyali* for Ganesh and the leaves of rare selected varieties of trees. A variety of fruit, both edible, and non-edible decorates the altar for the Ganesh festival in the form of *Matoli*.

Yagnas or sacrificial fires use twigs of various specified trees. Besides different *vratas* different deities have their own favourite types of flowers and colours: red for Ganesh, yellow for Vishnu, white for Shiva and so on. Exchange of twin leaves of *Aapta* (*Bahunia* variety) on *Dussera* is practised as a token of friendship and so is the playing of *Holi* with coloured water prepared by soaking the dry flowers of *palash* (Flame of the Forest). The use of

synthetic colours for Holi is a recent practice. These are some practices that show the intimate relation between man and nature, closely linked with cultural rites. Burning at Holi festival is perhaps the only anti-ecological custom, and the use of indecent words and shouting are probably a safety valve to release the antisocial instincts of people.

Tamarind, *amla* and sugarcane are invitees to the Tulsi marriage ceremony. The *audumbar* tree is believed to be the resting place of Lord Dattatraya. *Peepal* is also a divine tree. Nor is this all. Many trees in villages are protected as the abode of the spirits. While most of Maharashtra has been ruthlessly denuded of trees, many green oases are conserved as *Devrayees*—God's jungles. In Goa also there are patches rich in biodiversity, conserved on account of the belief that one attracts a divine curse if one takes away anything from the spot—even a twig. One may consume anything on the spot but not take away. Nothing can be more ecologically sound than this simple principle.

Water is another natural element which is worshipped above all else. No religious rite can take place without water. It has been worshipped on various occasions and in various forms. Main rivers, the sea and many waterbodies are designated as sacred *teerthas*, capable of washing away sins. Water is so highly esteemed that it has been ceremoniously placed on the highest spot of the temple—on the *shikar*—in the form of a *Kalash*—a symbolic pot of water.

Animals, both domestic and wild, form a part of the religious practices. Worship of *Gomata* and the bull is common. The elephant represents Laxmi. The Cobra, king

of the reptiles is also worshipped—to kill it is a sin. A day in the month of *Shravan* is fixed for feeding aquatic creatures. Turtle and tortoise are divine creatures. Fish turtle, wild boar, lion are the incarnations of Lord Vishnu. Religious rites of inauguration of a well include releasing of turtle, fish and frog into it. All these are known to keep water clean. The crow is supposed to represent the deceased and is fed on death anniversaries. The crow-pheasant is a slow breeding bird and is believed to be a good omen when sighted. This might be to ensure its protection. To kill a cat or a frog is held to be a great sin, perhaps because both are efficient pest controllers.

The Vedic scriptures, teachings of sages and saints, exhibit a profound knowledge of ecology. The religious practices and cultural rites and rituals are also designed to promote conservation. However, present religious practices are perverted by commercialism, rowdyism, political expediency and senseless blowing up of the physical dimensions of the celebrations. Chanting of mantras in rich resonant rhythm has been substituted by the blaring noise of loudspeakers. Diwali is the celebration of the victory of Lord Krishna over the demon from hell, the *Narkasura*. Nowadays Krishna is nowhere to be seen while the *Narkasuras* are growing in size and number. The monsoon being over, people are supposed to clean the surroundings and illuminate the cleaned area. Now instead of cleaning there is littering. Monitor lizards are killed for the drums of *Ghumtan* for Ganesh Chaturthi a greater travesty of the conservation ethic associated with festivals could not be imagined.

K.D. Sadhale

Mannge Thapnee: The Worship of the Mugger Crocodile

There is only one study on the Mugger Crocodile that has made its habitat for several centuries in the Cumbarjua canal of Goa. The WWF study titled 'The Status of the Mugger Crocodile in the Cumbarjua Canal of Goa' was completed in 1993 and has 4 authors (Manoj R. Borkar, Meenakshi Mallya, Samuel Christopher and Sulabha Phatak). The study goes into several aspects of the crocodile habitat at Cumbarjua. However, its most interesting aspect is the interaction between these crocodiles and the local population of Cumbarjua. The study records the very specific practices of '*mannge thapnee*' or crocodile worship in the villages of Bhoma and Durbate Wadi in Ponda Taluka.

In Goa, such a religious practice goes on in Bhoma and Durbate Wadi in Ponda taluka. The day of worship is the new moon day of 'Pausha' month of Hindu calendar. Incidentally this day also coincides with the commencement of the threshing of harvested paddy. Paddy field workers equalling the number of fields assemble on the bunds. They then get into the waterlogged paddy fields and scoop the silt. This silt is then deposited on the bund and given the shape of a crocodile. The scutes and the eyes of the crocodile are made by planting clam shells in the appropriate place. Teeth are made with small straight sticks. A little mud is then scooped from the back of the crocodile dummy to make a pit. A



Maange Thapnee — worship of crocodiles by Cumbarjua villagers.

live chick is then introduced into this pit and it is closed with a coconut shell. The crocodile is then decorated with flowers and vermillion. A community prayer (*Garhane*) then follows. Offerings of puffed rice and jaggery are given to the god and then shared by the devotees.

In Bhoma, a small village also along the Cumbarjua canal, Mugger *pooja* also includes a goat sacrifice. The goat is taken in a ceremonial procession on all the bunds along the canal and then sacrificed. Its meat is then distributed to all the villagers as '*Prasad*'.

Discussions with the tribes revealed that this practice has been going on for generations to-

gether without a break. According to them, it probably started early enough when the paddy fields adjacent to the canal used to get waterlogged with sea water thereby destroying the crops. The hypersaline soil was rendered less desirable for agriculture. It is then that the villagers decided to pacify the sea by worshipping the crocodiles, which were abundant in the sea then. Curiously enough, since then this practice continues with participation of the youth.

The origins of the marsh crocodile in this area are still controversial. One Portuguese document dating to a period when Goa was ruled by Muslims 40 years prior to Portuguese conquest has a reference to the 'island of Tiswadi starting from the East pass called Banastarim, where it crosses the firm land until the sea enters through two wooden shacks which are opposite to the West'. This document reports that the entire island was infested with 'Lizards of Water', wild animals of human size.

It is not known still whether the crocodiles had anything to do with the purpose of defending the island as the Portuguese had a custom of maintaining the reptile as a pet at Malwara, Colombo, Kalutara and other river ports. In any case, what these documents have confirmed is that the Mugger which now occupies the Cumbarjua has been doing so for over 500 years.

Why Lord Ganesh should be declared Patron of the Planet's Ecology

A decade ago, I was invited to participate in a conference in Germany on the subject of religion and ecology. There was the inevitable discussion regarding which religion had produced the best and the most profound ecological thinker or personality on this earth. The Christians voted unambiguously for St Francis of Assisi as the patron saint of the ecologists and environmentalists of the planet. I did not disagree: who can dispute that St Francis—with his enormous love for the animals and the birds—was indeed a natural and obvious candidate for the honour? However, I exercised my option of proposing a better candidate from India for the distinction. Much to the astonishment (and probably annoyance) of my exclusively Christian audience, I proceeded to introduce them to Lord Ganesh. They had naturally not heard of him.

Lord Ganesh, Ganesha, Ganapati is the foremost among all gods in the Indian pantheon. He is easily recognised by his pot belly and elephant-head. He is also an extremely jovial god. In Goa, no festival is greater than the festival associated with his arrival and departure. Goans take Lord Ganesha extremely seriously. They stop eating fish once he enters their threshold. They stop work as well, the economy be damned. They concentrate on cooking good food, making enormous piles of sweets, feeding their neighbours (Christians included), and visiting relatives and friends. Only after Lord Ganesh has been immersed in village *nallahs*, wells and ponds, or in the sea, will they allow the preoccupations of daily life to resume.

So how is Lord Ganesh associated with ecology? To understand the connection, a little background is required.

Hindus have a far different attitude to material progress than what has been broadcast in the past couple of centuries. Several European scholars, called orientalist, were convinced that India has always remained a passive, fatalist civilisation, unconcerned about the material world, solely preoccupied with being liberated from the cycle of rebirth.

But this has rarely, if ever, been the case. Hinduism, in strong contrast to the Christian religion, has always promoted a positive approach to material progress, well-being and prosperity. These are legitimate aims for human endeavour. But in the Hindu philosophy of life, the idea of material progress centres around the idea or notion of *mangala*.

The literal meaning of the word '*mangala*' is to 'move forward'. Moving forward builds strength. However, it is important to see *how* we move forward. In moving forward, we have to see that no one else is harmed in the process. If our objective is narrow and only directed to our own good and welfare, then it becomes *amangala*, that is, movement in a direction away from *mangala*. Efforts at material progress that do not



take into consideration the welfare of others ultimately lead to self-destruction. Only that culture can prosper which is beneficial to all, in which people's interests do not clash unnecessarily, in which even the life of birds and animals is made comfortable and looked after, and the resources of nature are used in such a manner that when we use them we increase them as well. Only such a society can be called a *mangala* society and is worth striving for.

Thus, when a farmer cuts wood in the forest for his use, it becomes his duty to ensure that no harm is caused to the forest as a whole because of his actions. Even settlements were regarded as a cause of pollution in ancient times. That is why it has been prescribed that whenever there is habitation, trees should be planted to keep the air pure. People are aware that if they transgress nature's interests, their path is bound to be blocked by obstacles and that destruction would soon follow.

Today's development model which has been adopted in India by several elected governments is based on a wholly imported philosophy: the ideas, in fact, of an Englishman named Jeremy Bentham. He ruled that *any* action could be defended or supported so long as it could be shown that its consequences led to the happiness of the largest possible number of people, even if in the process, a number of people were definitely abused. This principle came to be called the Principle of Utilitarianism.

Mangala does not mean progress. In today's understanding of the idea of progress there is no requirement that people bother very much about whether they are harming the interests of others or not. Hence, the ideal of utilitarianism is repugnant to a *mangala* society. Progress, defined in the utilitarian way, leads to *amangala*: it actually hinders the welfare and prosperity of society as a whole.

Lord Ganesh is the god of *mangala*. That is why he is worshipped whenever people wish to commence any new activity. The worship of Ganesha purifies the mind, clears out self-interest, creates purity of means and goals, and arouses in us a feeling desiring the welfare of all. For this reason, Lord Ganesh is often also worshipped as the 'remover of obstacles'.

Therefore, whether we plant a tree or excavate a well or even build a house, we first place an idol of Lord Ganesha there. With his blessings, we believe all obstacles will be removed. In addition, no one will harm us as well. The prosperity that we generate by our actions will always remain a blessing and not a curse. All of creation will survive and flourish, since no one will pursue his interests to the detriment or exclusion of others.

For these reasons, the *pandal* in which Lord Ganesh is placed for veneration is invariably decked with a colourful profusion of plants, flowers, fruits and vegetables. Most of these '*matolis*' in fact represent or symbolise the diversity of nature that Lord Ganesh represents.

Many of these insights associated with the festival of Lord Ganesh are unfortunately not being passed on to the next generation which is brought up instead on a diet of books that hardly represents and promotes the best of India's ecological traditions. The worship of Lord Ganesh has also been hijacked by some who have long divested themselves of either purity of feeling or intent, or concern for the rest of creation, whether human or animal.

As Nandkumar Kamat writes: 'In an age of forces trampling upon and destroying Goa's life-support systems, agro-economy and promoting monocultures of development ideas, private and public worship of Lord Ganesh needs to be given a new meaning for developing the lost ecological vision of our society.'

In the end, Lord Ganesh and the principle of the *mangala* society associated with his worship, remain the only remaining guarantee of survival in a world that is fast seeking to enhance and to globalise the tendencies of greed, competition, exclusive wealth and anti-nature assaults. The idea of progress that forms the basis of the globalisation project enforced by the WTO, the World Bank and other international agencies is profoundly *amangala*. For this reason, the sooner we reject it the better. In any case, we will never be happy with it since it goes against the very best of what our traditions teach.

We should therefore all adopt Lord Ganesh as the true patron god of the planet's ecology.

Claude Alvares

INTERDEPENDENCE

Goa, in the beginning, had a largely Hindu population. Then, came the Portuguese, and with them, Christianity. Goa was sought to be made into the Rome of the East, with the creation, through conversion, of a fairly large Roman Catholic community. Initially, despite their Christian skins, the Catholics remained furtive Hindus. The Inquisition was directed against this 'unholy' tendency of these early converts to clandestinely retain their links with the Hindu faith. Certain phenomena, like caste, the Inquisition was unable to change. The Goan church eventually came to crystallise that institution in the form of the '*confrarias*'.

But the Hindus and Christians are blood brothers, and blood must remain thicker than water. The new Catholics rapidly built bridges that conserved their relationship with the older community. Thus were the harsher alienations created by colonial rule mitigated. Those bridges have remained largely intact to this very day. But now, like the former Mandovi bridge, they could also fall victim to the corruption and corrosion of politics. If that happens, the resulting chasms will not be put together by engineers or contractors. For that one requires somebody like Mahatma Gandhi, and nature has shown it will be severe and sparing with those kinds of individuals.

One of the commonest traditions still operating today involves the attendance of Catholics at some of the festivals of temple deities. Many Catholic families have retained their Mahajanship (membership) in Hindu temples. When they appear during religious ceremonies, the Hindus must wait till the Catholics are given the *prasad* or *kaul* before getting theirs.

One of the most well-known examples of Hindu-Catholic interpenetration in ritual concerns the *Milagres Saibin* (the Queen of Miracles). The town of Mapusa, even today a strong pro-Marathi stronghold, has a famous

church dedicated to St. Jerome. But the church is known more popularly as the Milagres church. The church was built in 1594, near the ruins of the famous temple of Santeri (the idol was later removed to Dhargal in Pernem). Therefore, the site itself has sacred value for both Hindus and Catholics.

Now what brings the two communities together is the traditional *feira* of the Milagres Saibin, usually celebrated on the Monday of the third week after Easter. Hindus and Catholics assemble in large numbers to venerate the Saibin and to offer candles and oil to her.

Legend has it that the Saibin is actually one of the seven Hindu sisters who was converted to Christianity by the Portuguese. The names of the seven sisters are known: Lairai, Mahamai, Kelbai, Adibai, Marzai, Tulzai and Shitala. Another legend holds that all seven sisters were converted, the other six including the Saibin of the Rosary at Navelim, the Saibin of Candelaria at Pomburpa and so on. Apparently, it is the former legend that draws the Hindus to the church. The church had to be rebuilt twice in its long history, and on both occasions contributions came from both Catholics and Hindus.

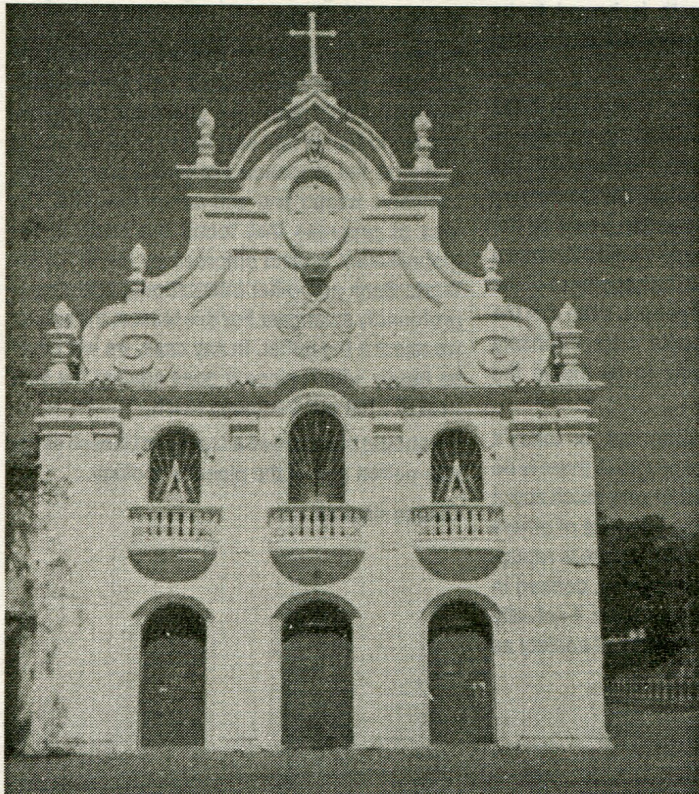
Another church frequented by Goans irrespective of religion is the church of St. Anne at Talaulim. The church actually began as an '*ermitta*' (a small chapel, usually in an isolated place), and was placed under the invocation of St. Anne after a villager, Bartholomeu Marchone is reported to have seen a vision of an old lady, wearing a hat and with a staff in hand, coming down a neighbouring hill, saying her name was Anne and that she desired a home in the village. A similar vision was also seen by an old Brahmin (some say an old Hindu woman of noble birth) who thereafter recovered from her deathbed miraculously.

But the two communities flock to the church for a special reason. According to Catholic tradition, St. Anne, being the mother of the *Saibin*, will grant children to the childless, and marriage partners to the young. So on her feast day, which is celebrated on July 26th, young men and women flock to the church with typical offerings. Young men offer her a *culher* (spoon) in exchange for a *mulher* (wife). Young women will offer *urid* (mung dhal) and ask for a *marido* (husband). Newly married but childless couples ask for a *menino* (baby) for which they offer a *pepino* (cucumber). In fact, the *feira* is popularly designated the '*touseamcheam fest*' or cucumber feast.

In Goa-Velha (once the capital of the Kadamba empire), the penitential procession of Saints of the Franciscan Third Order takes place on the first Monday of Lent. This event takes place in only two places in the world: Goa and Rome. The procession commences at the Pilar convent church, winds its way through the neighbouring village passing *en route* temples and other Hindu religious places.

Another similar event of significance is the Good Friday procession in Panjim. Though the Procession consists only of Catholics, it stops *en route* at the house of some well known Hindu families, including the Caculos. The *balcao* of the Caculo house is illuminated with oil lamps and the family places a huge blanket of flowers on the casket containing the body of Christ.

Another Catholic festival in which Hindus play host is the Siridao festival, celebrated every year on the Sunday following Easter. People from all over Goa attend the



chapel *fešta*. In fact tradition rules that one must attend the *fešta* at least once during one's lifetime to partake of the *cunji* that is distributed after the Solemn High Mass.

The chapel is located in the property of the well known industrialist, the Dhempes. And it is the Dhempe family which every year distributes the *Cunji*. Twelve *mudos* of rice with *amlee* are cooked in giant utensils and distributed by twelve girls wearing colourful clothes, rich ornaments and sweet smelling flowers.

But just as Hindus participate in Catholic rituals, Catholics also participate, as we noted earlier, in Hindu rituals. A good instance is the pestle dance of Chandor. Chandor is almost entirely Catholic in composition, but it retains its past links with the Hindu regime of the Kadambaras, as is seen on the occasion of the *Musalam Khel* or *Musal nritya*. The dancers dress in costumes dating back to the Yadava period and throughout the dance the Shivalingam is brandished about. The dance troupe proceeds from house to house (just as the Hindus do during Shigmo) to perform in the courtyards of each house.

According to tradition, the pestle dance was first performed at the gate of the capital of Chandrapur (modern Chandor) *circa* 1370 in celebration of the victory of the Vijayanagar ruler, Prince Harihar, over the Cholas.

These are all the more spectacular cases of intercommunity participation in ritual and culture. One has not included the routine ones. The Hindus for instance always cook *sannas* on the occasion of the chapel feast of their village. The Catholics put up their own contributions during festivals of village deities. Just to give one instance: the Sri Anant Kalo deity of Savoi-Verem, Ponda, is taken every year in a palki and procession, under colourful arches. One of those arches is always put up by Ubaldine Dias, a tavern keeper from Savoi.

The most unusual case of Hindu-Catholic togetherness comes during the Siolim *Zagor* (wake).

The *Zagor* is a night long event, devoted to celebrating the legendary god of Zagor, and the dance drama it consists of is not based on any continuous plot or narrative, and is sandwiched between a *teatr* (Konkani drama) and singing.

The deity called Zagoryo has a spot sacred to it in Siolim. There is a small dome shaped shrine under a *peepul* tree with no icon or image. Hindus traditionally offer oil, while Catholics, offer candles. Every house in addition sends offerings of *pohe* (puffed rice) to the Zagoryo so that the deity may protect the village from river water bursting the bunds that enclose their fields.

According to popular legend, Bardez (or Bara-desh) originally had twelve *Zagors*. The festivals were discontinued by the Portuguese. But sometime later, the people of Siolim felt that several natural calamities that had befallen the village must have been due to the cessation of this ritual. So with the mediation of the church and some priests, the *Zagor* was resumed *circa* 1865, and has continued uninterrupted ever since.

For this one night, there are indeed no Catholics or Hindus, only Goans. The procession stops both at a wayside cross, where the Catholics recite a rosary and the Hindus stand respectfully behind, and later, at a Hindu shrine, where the Hindus take the lead and the Catholics wait in prayerful silence.

The traditional roles in the dance drama that follows are assigned to certain families hereditarily: the Shirodkar and D'Souza families send an equal number of participants for the religious dance.

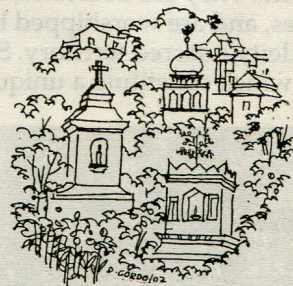
The first *naman* (or invocation) to the Zagor takes place at the *mand*, the consecrated space. The *mand* is always at the Catholic house, although the *guravship* (priesthood) hereditarily belongs to the Hindu Shirodkar family. Prayers are recited by the *Purohit* in Konkani at the household shrine and cross, asking that the festival be observed in its true spirit, that the village be spared calamities, that no quarrels divide the people and so on. At one point during the proceedings, the *Purohit* recites the main events from Christian scriptures.

At the end of the glorious finale, at dawn, the Zagor is taken to its shrine in a farewell procession: offerings of *sannas*, roasted gram and *feni* are made to the deity, as all those assembled drink and dance in a frenzy.

During the riots, a few imported non-Goans attempted to stone some crosses and temples, something that has rarely occurred in Goa. The ordinary Goan would be appalled to think that religious places can be blasphemed. But right now the politicians are in command, politicians who have alienated themselves from all values except the brute one of seizing power, through behaviour that in the given context can only be seen as unaccountable. This phenomenon has ruined the rest of the country, and attempts are being made to poison Goa too. Whether the Goan will allow that to happen is for future historians to discover.

Norma Alvares

(Note: The above article was written in 1986 during the Konkani agitation. It is being published here because it continues to have relevance today.)



SACRED GROVES

Sacred groves have drawn considerable attention in recent years. A sacred grove is a patch of forest near a village or amidst forest covering an area of between a few square metres to as much as twenty hectares in some cases. The area is afforded protection by the village communities and is a valuable example of successful social fencing. All forms of vegetation within the grove are considered sacred, as distinct from the common phenomenon in India, where single specimens of trees (particularly 'vad'—*ficus bengalensis* and 'peepal'—*ficus religiosa*) are worshipped and protected. The boundaries of the grove are clearly known, even when surrounded by forest on all sides. The grove can easily be distinguished from the surrounding forest as it harbours virgin forest in its climax condition, unlike the rest of the forest which is likely to have suffered some human interference. The sanctity of the place is maintained by following rules passed from one generation to another.

Unfortunately, in modern times, the taboos surrounding the groves have weakened and groves have been steadily shrinking in size. Even in the remaining areas, human interference is on the increase, due to increasing commercialisation and the influx of outsiders who do not have the same respect for the tradition that locals do. This is unfortunate, as the groves constitute the last refuge of vegetation species, which may have died out from the surrounding forest (or are available there in considerably degraded form). They also provide a shelter for wildlife, as there is usually a taboo against harming any living being in the grove.

The Tradition in Goa — In Goa, as well as in most parts of India, care and respect for nature has been influenced for centuries by religious beliefs and concerns. The sacred groves that exist in the Western Ghats of Goa are repositories of plant and animal wealth that have been conserved over centuries. They are dedicated to forest gods or other local deities, and are worshipped by local inhabitants as the deity's sacred territory. Sacred groves are green patches, which constitute a unique example of

in situ conservation of our genetic resources. These areas show microclimatic conditions within their own distinct floral and faunal values, and are important in terms of providing water for irrigation and drinking purposes. The ethnobotanical value of sacred groves is also an important factor leading to their protection by local communities.

Since ancient times, these sacred groves are undisturbed and due to this they are a haven for birds, animals and plants that might otherwise have become locally extinct. A typical grove surrounds or adjoins a stream fed by a perennial spring. As trees outside the grove are cut down, the springs they protect may dry up soon after the end of the rains. The sacred grove then becomes the last refuge, not only of plants and animals, but even of life-giving water. They are indigenous ecosystems which are managed by traditional societies and are shining examples of how our natural resources can be effectively managed. The rich tradition of maintaining sacred groves is one method of expressing gratitude to the trees which have supported and sustained human life under a given agro-ecological condition.

The area usually has rich vegetation, but in a few places only a few tree species are seen. The forest types range from moist deciduous forest to semi-evergreen forest. It is evident that the rich biodiversity of these areas is retained in the name of religion and tradition. The floral and faunal diversity occurring in sacred groves is vast. Many floral species occurring within the grove are not found in the surrounding forest due to over-exploitation. This area acts as a gene pool reservoir. Floral species like *Saracca indica* and climbers like *Gnetum ula* (the only gymnosperm found in the Western Ghats) are seen in these sacred groves.

Some groves have rich faunal diversity as well. Faunal diversity of the area depends on the location, i.e. if sacred groves are near the forest they are very rich in faunal diversity, but in case of isolated sacred groves they act as a refuge to smaller animals, and have poor faunal diversity. Smaller animals like mouse deer, Indian pangolin, barking deer, civet cat, land squirrels etc. are found. Some of these animals breed here, as the area is not allowed to be disturbed. Rare snakes like Golden Vine Snakes, Shield Tails, Flying Lizards or Dreco are found. Apart from this, bird and insect life is at its best. The lofty trees provide nesting sites to the birds like Great Pied Hornbill, Malabar Pied Hornbill, Indian Giant Squirrel, Flying Squirrel, etc. As hunting and killing of animals is not permitted in this area, animals take refuge here.

Waterbodies like springs and ponds in the sacred groves suffice for the needs of villagers and wildlife. Perennial springs feed water to the streams in the area. In some sacred groves, it is believed that the springs have medicinal properties and the water is used in treating skin and other diseases. Ethnobotanists depend on sacred groves for many plants that are not found in other areas.

In Goa, sacred groves are known by names such as 'Devrai', 'Devgal', 'Devran' or 'Devavan'. Earlier, almost all villages had sacred groves, but today there are only a few places where the tradition is still alive. These groves are ancient, untouched, protected, virgin forests. In some places these groves are small.

In Quepem taluka, there is a very interesting sacred grove at Morpila, which protects the source of a moun-



tain stream called 'Paikacho Vhal', a stream of the forest-spirit 'Paik'. To reach it, one has to remove any leather sandals, climb a steep gradient, enter a long tunnel of bushes, walk on all fours as the tunnel gets narrower and narrower and then come out to witness a cascading spring emerging out of the heart of a dense forest. According to Dr. Nandkumar Kamat, 'Not a leaf has been lifted from this area for thousands of years. This makes the grove a repository of ancient, untouched biodiversity... The Velip community has zealously tabooed and guarded this place for centuries... Morpila's sacred grove is a wonder of nature because of its pristine habitat and undisturbed biodiversity.'

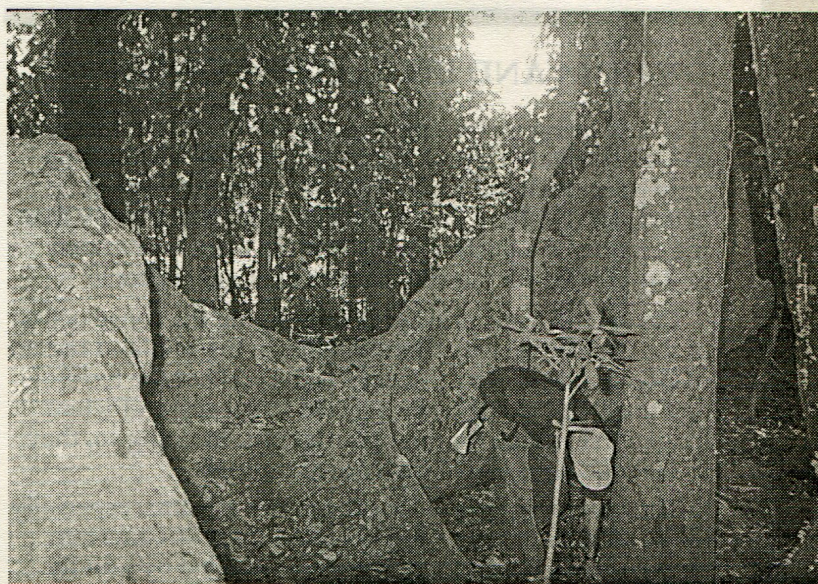
Sattari taluka has a long and cherished tradition of sacred groves, which has been kept alive to date. Many villages in Sattari have guarded their sacred groves with an intense degree of devotion and holiness. The people of Sattari consider the forest of the sacred grove, with all its floral and faunal diversity, as their provider, taking care of their needs and welfare. People believe that the presiding deity of the grove would be offended if any life—plant or animal—in the deity's dwelling place were harmed. Breaking even a dead twig in a grove might result in serious illness or violent death.

There are many sacred groves situated in Sattari. Caranzol village has three sacred groves, viz. *Holiyechei Rai*, *Karalachi Rai* and *Honnulechei Rai*. There are two separate sacred groves in Sattari named after the deity 'Nirankar'. The first 'Nirankarachi Rai' is near Zarme, Dabe and Saleli villages. The second 'Nirankarachi Rai' is located at Bambar near Valpoi; it is the abode of rare medicinal plants. This sacred spot is a refuge for a unique forest community and is classified as 'Myristica swamp forest' having great ecological significance. The Goa Forest Department has studied the grove in depth and published a pamphlet on it, from which some of the following information about this grove is taken.

This grove has been known to exist for the last 250 years and the reigning deity is the God 'Nirankar' who is worshipped by the locals of Maloli, Uste and Nanode. Their deep-rooted religious belief is responsible for keeping this grove more or less untouched.

The grove covers about 0.25 ha of undulating terrain. The natural vegetation of the area is of tropical hill forest dominated by evergreen broad leaved species. The floral composition of the grove shows the presence of a large variety of plant species as well as several species of algae, lichens, epiphytes and undergrowth plants, which are yet to be identified.

One of the unique features of the trees in this habitat is the presence of numerous aerial roots in the shape of a 'U' arching over the mud. These roots resemble a knee when the leg is folded. The ecological significance of these peculiar knee roots is an adaptation or reaction to overcome environmental stress. Presumably, this is twofold—first, one in which the plants overcome poor anchorage in a soft bed and second, ensuring root aeration when oxygen is not available in the soil. In either case, it is analogous to the adaptations found in mangroves. The knee roots suggest the presence of an underground stream creating conditions similar to those of mangrove swamps. The sacred grove of Bambar is a unique sacred grove and hence it has become a source of attraction to botanists.



One of the best-preserved sacred groves of Goa is situated in Keri, a beautiful village encircled by a chain of lush green mountains. Since ancient times, this village has a tradition of maintaining sacred groves. The *Pishachi Rai*, *Biramanyachi Rai*, *Baldyatli Rai*, *Komachi Rai* are some of the prominent sacred groves of Keri. However, it is the *Ajobachi Rai* located in this village, which is the largest sacred grove in Goa. Just one kilometre from the temple of Sateri Kelbai, this sacred grove lies on a hill slope and covers a large area of 10 hectares. The reigning deity of the grove is an holy spirit known as 'Ajoba' (grandfather), who is worshipped by the villagers. The small shrine of the deity is situated outside the sacred grove in the vicinity of the Sateri Kelbai temple, where devotees offer sacrifices of cocks and goats twice a week on Sundays and Wednesdays. These customs and rituals are still observed, despite changing life-styles and preoccupation with material gain. This deity is honoured by all the villagers irrespective of caste and creed and due to this, the grove is well preserved.

The primary forest of the grove is composed entirely of trees about 25 metres tall with little shrub or herbaceous undergrowth. The dominating tree species are *marat* (*Terminalia crenulata*), *kindal* (*terminalia paniculata*), *zamba* (*xylia xylocarpa*), *nano* (*lagerstroemia lanceolata*), *shivan* (*gmelina arborea*), *dhaman* (*grewia tillaefolia*), *goting* (*terminalia bellerica*), *onwal* (*mimusops elengi*), *vad* (*ficus bengalensis*), *moi* (*lanea grandis*), *palas* (*butea monosperma*), *vavalo* (*holoptelia integrifolia*), *pangaro* (*erythrina indica*) and several other tree species. The forest is also rich in innumerable woody climbers.

Not only plants, but animal life also receives absolute protection in this grove. Even during 'ganv bhovni' (traditional hunting by villagers), no one dares to enter the grove in search of wild animals. *Ajobachi Rai* is a unique example of forest conservation. It is a pity that this grove has not attracted commensurate attention from Goan scientists, foresters, botany students and administrators. Vagheri, at 3500 ft is the third highest mountain peak of Goa. This isolated peak too has a sacred grove known as 'Mauliche Rai'.

Rajendra Kerkar

For a list of sacred groves in Goa, see p.26

DHARMA AND IRRIGATION TANKS

It is now being increasingly recognised that our ancestors in Goa cultivated a philosophy and way of life that can only be understood in the light of largely ecological principles. Nothing illustrates this more remarkably than the manner in which water resources were husbanded and protected for sustainable use over generations.

One of the main principles underlying the construction of the traditional irrigation systems in the midland region of Goa dominated by plateaus is the scale of the technology used: our predecessors raised small-scale, efficient irrigation systems for their plantations. In doing so, they made ingenious use of their surroundings.

They were experts in locating water streams, especially in the corners of hills. They directed these streams into storage tanks from where the water was led by gravity flow through channels to cultivate horticulture (*kulagar*) crops on the terraced hill slopes.

Some of these irrigation tanks are still in use, while many have fallen into disrepair. The Bhootkhamb tank with its reservoir has fallen into disuse. It was constructed with the finest laterite and endowed with sluice gates. Recently, some efforts were made to rehabilitate the tank.

G.N. Kapadi, a former Superintending Engineer with the Irrigation Department, carried out an interesting little study on the traditional structures used in irrigation in the past in Goa. He documented the following irrigation works:

The Salgaoncar bandh: According to Kapadi, it involved the construction of a temporary *bandh* every year across the Dudh Sagar river. A *kacha* canal carried the discharge for a length of 5-5.5 kms and included the construction of about 4 to 5 tunnels. The canal was constructed 300 years ago by the 'Bhos'. The *bandh* and the canal are still in use.

The Shitale tank: Located in Savoi Verem. It consists of a permanent structure of laterite stones with headwork from which the canal takes off. The headwork was unique as it was regulated by means of planks.

The Mandodari tank: Located on the Betki hillock at Savoi Verem. It is an ancient percolation tank and is named after the temple of Mandodari, one of the 5 *pativratas*, wife of the king Ravana of Sri Lanka. The outlet from the tank is kept open during the monsoon and closed at the fag end and this enables water to be collected over an area of 3-5 ha. The storage charges the springs below and enables villagers to grow paddy and areca nut in an area of about 100 ha. The villagers call the tank their mother. It has been repaired by the irrigation department and is still in use.

One very large tank has been destroyed due to the location of the Selaulim dam reservoir: this is the Bhosale *bandh*. In Kurdi (Sanguem) the temporary obstruction to the water (*bandh*) was done by all the villagers collectively at the end of the monsoons and hence the name 'Bhosale' derived from the word 'Bhos' meaning people or public. The *bandh* was located across the river Guleli, a tributary of the Sanguem river. The Selaulim dam is across the Sanguem river and its reservoir permanently submerged the Bhosale *Bandh*.



Carved image of Kalbhairav on tank embankment

The spring tank near the village of Gaodongri on the Canacona-Margao Road is an excellent example of a spring protected and surrounded by a temple and leading into a tank which irrigates several hundred hectares of areca nut plantations. Similarly, the Kale village north of Sanvordem has another interesting example of a spring tank. There are four to five such tanks to the south of the Bale valley (Bhave village etc.). In the north eastern areas of Sanguem as well, there are several such 'spring-tank-temple complexes'. In the case of Valpoi, the traditional water harvesting system by gravity flow survives to this day and continues to be the main source of urban water supply.

Leaders of the communities at the time these irrigation systems were raised relied upon the deep-rooted faith of the members of the community to protect water sources and works of civil engineering.

Thus, on the embankment of every water reservoir, they built the temple of the presiding deity of the village (*gram devta*) or installed the fearsome image of the warrior god (Kalbhairav). Such images succeeded in creating feelings of sacredness and respect for the immediate environment so that the water course was well-maintained without pollutants. Today, we continue to neglect this crystallised wisdom of our ancestors and ruin our ecology, allowing these ancient schemes to die by disuse. There is an imperative need to learn from the past, to once again repair and maintain these ancient eco-efficient water systems built at minimal cost for maximum advantage.

Last Page: Books and Websites on Goa

Goa has given birth to a rich and fairly unique culture, with music, art and literature flowing generously through the veins of its inhabitants. Books appearing in pre-Liberation (1961) days were largely in Portuguese and occasionally in Romi Konkani. The number of books was also fairly limited, what with poor literacy rates. But post-Liberation there has been a remarkable literary efflorescence. A good deal of this is in English but literature in Konkani and Marathi also commands a steady and respectable market.

As a muse, Goa exercises a hypnotic charm on those who have once succumbed to her spell. Many writers, both Goan and non-Goan, have repeatedly returned to Goan themes in their writings. The range of books on such themes is stupendous in its volume and variety, if one takes into account the relatively small size and population of the region. Practically every topic and subject is covered—from literature, art, history, music, guidebooks, cookbooks, sociology, anthropology, ecology, language studies, law books, or distractions for an idle moment.

The classic fictional snapshot of Goa published in recent times remains *Tivolem* by Victor Rangel-Ribeiro. It brings alive like no other book the atmosphere of village Goa in the 1930s. With a fairly interesting narrative centred around the relationship between a woman and three men who return to Goa to face a blend of traditional values, this book is a must-read.

Also not to be missed is *Ferry Crossing*, a collection of short stories on Goa edited by the well-known poet and writer, Manohar Shetty. The collection contains a number of translations from the Konkani and Portuguese, providing the reader with a glimpse of the literary output in these two languages in Goa.

Sorrowing Lies My Land is the classic fictional account of the first stirrings of a desire for freedom from colonial rule among the ordinary people of Goa. Centred around Tobias Costa, a nationalist gentleman-farmer, its gripping narrative helps us understand how colonial rule was perceived by Goans, and the influence of the wider Indian movement for independence on Goa.

A notable recent addition to the corpus is *Skin*, a debut novel by Margaret Mascarenhas. A fascinating saga, spanning several generations of a Goan family, this novel presents the rich tapestry of Goan society and history as viewed through the eyes of a woman living within two cultures.

There is a relative paucity of good books on Goan wildlife and environment. *Flora of Goa, Diu, Daman, Dadra and Nagar Haveli* remains the standard guide on its subject. For the layman, who wants something more accessible and colourful, *A Guide to the Flora and Fauna of Goa* by P. Killips is recommended. The *District Gazetteer*, published in 1979 and long out of print (you have to go to the Rare Books section of the Central Library in Panjim if you want to refer to it!) is a valuable source of a wide variety of information. Of course, you need no further guidance regarding the ideal comprehensive handbook on the subject of Goa—it is currently in your hands!

The problem with *Fish Curry and Rice* is that it is sometimes seen as a Goan recipe book! Booksellers display it in the cookery section. We don't mind really, since the book is about the Goan recipe for life in all its aspects.

But good conventional recipe books are not hard to find. People who visit Goa associate it with good eating, specially food which is really unavailable in other parts of the country. The following would be a good book-list for those who want to stack up on recipe books:

- Traditional Taste of Goa by K. Usgaonkar and S. Sardesai
- Essential Goan Cookbook by Maria Menezes
- The Best of Goan Cooking by Gilda Mendonsa
- Tasty Morsels by Maria Rodrigues

To get an idea of what makes Goan society tick, try *The Transforming of Goa* edited by Norman Dantas and *Of Umbrellas, Goddesses and Dreams: Essays on Goan Culture and Society* by Robert Newman. There are also a wide variety of coffee-table books that provide excellent visual introductions to Goa. Worth mentioning are *Houses of Goa* by Gerard Da Cunha et al., *Goaby* Mario Cabral e Sa and Jean-Louis Nou, *Baroque Goa* by Jose Pereira and *Palaces of Goa* by Helder Carita.

Other India Bookstore—The best one-stop shop for all books on Goa is *Other India Bookstore*, above the Mapusa Clinic, in Mapusa town, close to the world famous Friday Bazaar. It is the only book shop recommended by *The Lonely Planet* and other guides on Goa.

The bookstore prides itself on stocking all available books on Goa published in India. It refuses to stock books published from developed countries in order to promote indigenous intellectual creativity.

The bookstore has a wide range of titles on environment and ecology, wildlife, alternative agriculture and Indian health systems, and unconventional books for children. It stocks most publications brought out by NGOs.

It has a publishing arm called Other India Press which has over 50 titles in print on a wide range of pro-environment, pro-nature, pro-public issues.

Both Other India Bookstore and Other India Press are owned by a Trust. They bring out printed and Web catalogues of their titles.

Location address:

Other India Bookstore
Above Mapusa Clinic, Mapusa, Goa - 403507
Tel: 263306 email: oib@goatelecom.com

Website: <http://www.goacom.com/books>

For those interested in pursuing more information on Goa, its people, economy and culture, there are a number of interesting web-sites, most of them run by Goans. We are listing a few of these below:

- <http://www.goacom.com>
- <http://www.goenkar.com>
- <http://www.goanews.com>
- <http://www.nic.in/goa>
- <http://www.goa-world.net>

Happy cyber-surfing for those can't do the real thing here on a Goan beach.

Other India Bookstore at Mapusa, Goa: India's most unique book shop



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- The Goa Gazetteer editorial board was set up in 1970 by the Government of Goa and it produced the Gazetteer in 1979. The Gazetteer is a useful compendium of information on the State and its people, and we have relied upon parts of it in the preparation of this book, particularly sections dealing with geology, geography, flora, fauna and snakes. Of course, where necessary, data has been revised and updated.
- There is also a comprehensive list of medicinal plants and a list of fish, again with both their scientific and Konkani names. Very important is the list giving information on the main festas or festivals of Goa and the chief commodities sold during the fairs. Another list gives all the bazaars in the district. A very important section is a directory of all the villages and towns in Goa and a list of spellings of all place names, also given in Devnagari.
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Index

- Agriculture, decline of 96–97
 destruction of by mining 240
 history of 94–96
 Air (Prevention and Control of Pollution) Act 329
 Almeida, Sarto 302
 Amthane Irrigation Project 267
 Anti Meta–Strips Citizens' Action Committee (AMCAC) 355
 Anti–Pollution Citizens' Committee 356
 Aquaculture 186–190
 Aquafarms, and the Supreme Court 191–193
 two case studies of 194
 Arecanut 81, 115
 Automobile Pollution 322
Awadh's of Madkai 98
 Bahuguna, Sunderlal (on mining) 233
 Bailancho Saad 359
 Barge Traffic 238
 Beaches, conservation of 155–156
Bhaille—Outsiders 127
 Bhagwan Mahavir Wildlife Sanctuary 46–47
Bhovni Hunting 34
 Binani Zinc 76
 Biodiversity 55, 362
 Biomedical Waste (Management and Handling) Rules 337
 Birds 27
 Birds (list) 28–30
 Bondla Wildlife Sanctuary 48–49
 Botanical Society of Goa 361
 Carambolim lake 88–89, 92
 Cashew 114
 Centre for Environment Education 361
 Coastal Ecosystem 128–130
 Local Awareness of 169
 Coastal Islands 140–141
 Coastal Zone, Status of 130–136
 Coconuts 114–115
 Colvale Jagrut Manch 361
 Common Trees 24–25
 Communal Harmony and interdependence in Goa 368–369
 Comunidades 110–113
 Cotigao Wildlife Sanctuary 47–48
 Crocodile Worship 366
 Crocodiles 170
 CRZ Notification 330–332
 Cuncolim Industrial Estate 75
 D'Cruz Dean 301
 da Cunha, Gerard 300
 Dams, medium-sized 268
 Day at the Beach 171
 Deforestation and Rainfall 13
 Dempo Mining Disaster 229
 Department of Science, Technology and Environment (DSTE) 339
 Dhangars 45
 Divar Island 168
 Dorvol Springs 60–61
 Dr. Salim Ali Bird Sanctuary (Chorao) 49
 Du Pont 62–66
 Earthworms, and domestic waste 315
 Eco–development Plan for Goa 276–277
 Eco–tourism 221–222
 Environment (Protection) Act 328–329
 Environment Judgements 343–346
 Environment Laws in Goa 325–338
 Environment NGOs in Goa 353–361
 Estuarine Region, introduction 160
 Fauna 30–32
 Ferry Crossing 269
 Fish and Fishing, 172–174
 Fish Curry and Rice, recipes for cooking 19
 Fish, Fresh–Water (list) 185
 Fish, Salt–Water (list) 182–183
 Fisher Folk (*Ramponkars*) 175
 from Hunsur 184
 Fishing, effect of pollution on 178–181
 mechanisation of 174, 176–177
 monsoon ban 184
 Floods 123
 Floristic Diversity 23
 Forest Conservation Act, 325–327
 Forests, management of 42–44
 Fundação Oriente (Orient Foundation) 358
 Ganesh (Hindu God), as ecological icon 367
 Garbage 309–310
 Gavde 124–125
 Geology of Goa 7
 GIPL mining lease 243
 Goa, Ancient Names of 4
 Goa (Control of Malaria and Other Mosquito–Borne Diseases) Rules 338
 Goa Biodiversity Strategy and Action Plan 362
 Goa Daman and Diu Wild Animals and Wild Birds Protection Act 329
 Goa Desc Resource Centre (GDRC) 356
 Goa Environment Federation 356
 Goa Environmental Action Group (GEAG) 355
 Goa Forest Department 340
 afforestation programme of 80
 Goa Foundation 360
 PILs filed by 348–351
 Goa Heritage Action Group 358
 Goa Non–Biodegradable Garbage (Control) Act 338
 Goa Prohibition on Smoking and Spitting Act 338
 Goa Public Health Act 332
 Goa River Conservation Network (GORICON) 354
 Goa State Coastal Zone Management Authority (GCZMA) 340
 Goa State Coastal Zone Management Plan (CZMP) 333–334
 Goa State Environment Protection Council 340
 Goa State Pollution Control Board 340
 Goa Tourist Places (Protection and Maintenance) Act 330
 Goa, books and websites on 373
 ecozones 18
 history of 4–5
 misrepresentation by tourism industry 206–207
 Goa Daman and Diu Preservation of Trees Act 327–328
 Goa–Hyderabad Pipeline project 255
 Goan architects 300–302
 Goan Food, ecology of 85
 Grande Island 140
 Green Cross 353
 Hazardous Chemicals, transportation of 78–79
 Health, State of in Goa 321
 Heritage buildings, conservation of 284, 293, 295
 Heritage monuments in Old Goa, conservation of 296
 Hindu Religious Rituals, role of nature in 365–366
 Hindustan Petroleum Corporation (HPCL) 59
 Houses of Goa 298–299
 Hydrological cycle 8–10
 Impala Distillery 70
 In Defence of the Pig 323
 Indian Bison 31
 Indian Heritage Society (Goa Chapter) 358
 Indian Monitor Lizard 35
 Industrial Estates 71–73
 Industrial Time Bombs 58–59
 Industrial Waste at Colvale 69
 Infrastructure Projects 248–249, 257
 Insects 40
 Integrated Marine and Coastal Area Management Directorate 341
 Iron ore rejects 240
 Irrigation Tanks 372
 Kaiga Nuclear Complex 258–260
Khazans 99–107
 Konkan Railway 249–253
 damage to agriculture by 253
 through *khazans* 104–105
 Writ Petition on environmental damage by 254

- Kumeri* cultivation 125
 Lakes, freshwater 87–91
 Land Conversion 98
 Lawyers arguing Goa Foundation PILs 352
 LNG terminal 257
 Local Bodies and Industrial Projects 73
 Madei Bachao Abhiyan 354
 Madei Wildlife Sanctuary 50–51, 53
 Madei River: The Lifeline of Sattari 16
 Malaria, Resurgence of 320–321
 Mandovi Pellets 75
 Mandovi–Zuari Estuarine Network 161–162
 Mangrove Species, protected 169
 Mangroves, ecosystem functions of 164–166
 introduction 162–163
 restoring 169
 Mapusa, planning in 292
 Margao Architects' Action Group 358
 Margao, Planning in 289
 Marine Biodiversity 137–139
 Marine Pollution 149
 Mayem Lake, impact of mining on 242
 Meta Strips 67–69
 Mickey Mouse Architecture 297
 Mineowner's reflections 246
 Mineral Foundation of Goa 245
 Mining, 224–231, 234–236
 and dust 237–239
 and Mayem lake 242
 impact on agriculture 240
 impact on Opa water works 232
 impact on Selaulim water works 233
 TERI report on 241
 Mining Dust, health effects of 243
 Miramar Baywatch Association 358
 Miramar Beach Management Plan 150
 Molem National Park 47
 Monsoons 11–12
 Mopa International Airport 255
 Mormugao Port Trust (MPT) expansion 257
 Mormugao, planning in 288
 Mudskippers of the mangroves 167
 Mumbai High Court, Panjim Bench 342
 Municipal Solid Waste (MSW) Rules 337
 Mushrooms, wild edible 41
 Nadora Industrial Estate 70
 Netravali Wildlife Sanctuary 51–52
 Nirmal Vishwa 357
 Nirmala Institute of Education 361
 Nisarga Nature Club 359
 Noise pollution 309–310
 Noise Rules 335–336
 Noise, Important Government Circulars 336
 Standards on 336
 Olive Ridley Turtle 153–154
 Organic Farmers in Goa 117–122
 Organic Farming 116
 Outer Harbour 257
 Panjim, Alternate Development
 Plan for 286–287
 History and Planning 280–285
 Peaceful Society 357
 Penguin Alcohols 76
 People's Movement for Civic Action (PMCA) 353
 Piken Island 140
 Pilar Lake 89
 Plains region, 86–87
 Planning, history of 271–272
 Planning, in Goa's coastal areas 278–279
 Plantation Economy 114
 Plastic-Free Goa campaign 310
 Plastics Waste 309–310
 Plateau Region, general features 56–57
 and industries 57
Poder—Breadman 363
 Ponda, planning in 290–291
 Protected Monuments (lists) 294
 Public Health, Introduction 304–306
 Public Liability Insurance Act 329–330
Puran Farming 108–109
 Quitula (map) 92–93
Ramponkars' agitation 175
 Recipe for Life 3
 Recycled Plastics Management and Usage
 Rules 337
 Redi Pollution 157
 Regional Plan for Goa, 2001 A.D. 277–278
 Regional Plan for Goa, 2011 A.D. 278
 Reliance–Salgaoncar Power Plant 256–257
 Reptiles 30–32
 Research studies, critique of 341
 Rice, Traditional Goan Varieties 96
 River Princess 159
 River Systems 13–17
 Sacred Groves 370–371
 Sacred Groves (list) 26
 Sadhale, K.D. 300
 Saligao Civic and Consumer Cell 357
 Saline intrusion, in coastal areas 151–152
 Salmona Springs Struggle 318
 Salt Pans 158
 Sand Dunes 131, 142–146
 Court interventions on 347
 Sand extraction 147–149
 Sanjivani Sugar Factory 74
 Santa Monica Lake 89–90
 Sawant Committee Report 54
 Sculpture in Green 84
 Selaulim Dam 261–265
 Sesa Goa, restoration of mining areas 244
 Sewage Management 306–307
 Shiroda wetlands 91
 Snakes 36–39
 Socio-Economic Indicators 5
 Solid Waste Disposal (Municipal
 Councils) 311–312
 Solid Waste Disposal (Village
 Panchayats) 314–315
 Solid Waste Management, Good Practices 313
Sossegado 303
 Southern Birdwing 355
 Springs, Natural 317
 Stone quarries 246
 Sulabh International 308–309
 Sunrise Zinc 77
 Syngenta 59
 Tata Energy Research Institute, Goa 341
Taverna 223
 Teksid Kalyani 77
 Temple Zone 82–84
 The Art of Being Good Natured 1
 The Turtle 195
 Tillari Dam 265–266
 Toddy-tappers 126
 Tourism and environmental problems 201–205,
 208
 Tourism Master Plan 212, 217
 reaction of Goan NGOs to 213–216
 Tourism, Alternative forms 219
 basic facts about 199–200
 development of 196–198
 effects on coastal zone 218
 environment-friendly 220
 mass 202
 opposition to 210–211
 planning of 209–210
 Tourism-related paedophilia 216
 Town Planning, the reality of 273–275
 Turtles 153–154
 Undermining of Agriculture 247
 Village areas, destruction of 297
 Vivekanand Environment Awareness Brigade
 (VAEB) 354
 Water (Prevention and Control of Pollution)
 Act 329
 Water Problems, in Sangolda and
 Saligao 318–319
 Western Ghats in Goa 22–24
 Western Ghats: people and ecology 21–22
 Wetlands 87–91
 Wild Flowers 25
 Wildlife Act 329
 Wildlife Sanctuaries 46–49
 Wildlife, illegal trade in 33
 seizures of 32
 Zuari Industries Ltd. 58

FISH CURRY AND RICE

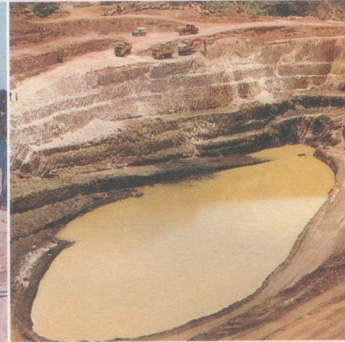
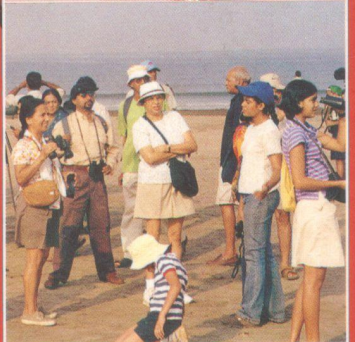
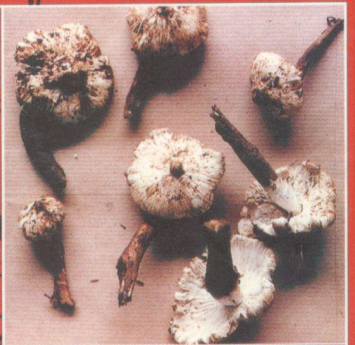
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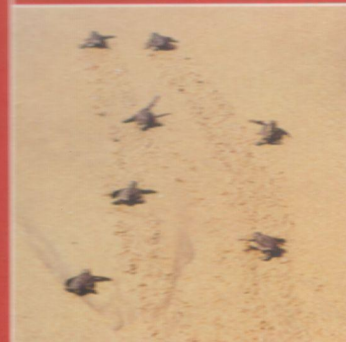
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